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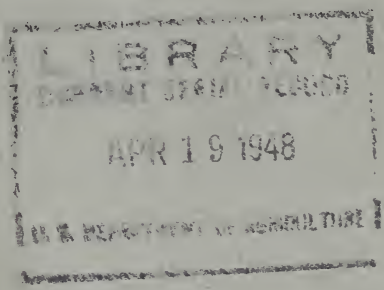
REPORT OF THE

Secretary of Agriculture

1947



REPORT OF THE

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1947

WASHINGTON, SEPTEMBER 30, 1947

To the President

AMERICAN AGRICULTURE IN THE WORLD ECONOMY

Under ordinary peacetime conditions the agricultural situation that has prevailed this year would be as favorable as any on record. In the first half of 1947 our farmers received the highest prices and enjoyed the highest income level up to that time. Prices and earnings in the second half will likewise be large. Cash receipts from marketings, plus Government payments to the farmers, were at an annual rate of approximately 28 billion dollars in the first half of 1947, as compared with 25.4 billion in 1946. Exports of agricultural products from January 1 to June 30 were about 1,700 million dollars in value, and higher in volume than the rate established in the last quarter of 1946 though somewhat below the rate for the whole of that year.

Food consumption in the United States during 1947 was on a high level; in fact consumer expenditures for food were above normal in relation to consumer incomes. Other indications were favorable, such as the net farm income; the ratio between prices received and prices paid by farmers; the farmers' financial position; the farm-mortgage debt—down about one-fourth since 1940; and the continued strong world demand for American farm products. Nevertheless, farmers and agricultural agencies could not take a wholly optimistic view because the situation included weaknesses and dangers.

Currently, the market is strong. But some of the reasons for this strength are temporary, such as the damage inflicted by the war on agriculture abroad, the extent to which the United States Government is financing exports, and the domestic employment created by accumulated demand for industrial products. Foreign agriculture will recover; United States export trade will eventually require financing by different methods than those now in use; and American manufacturers will catch up with their orders. Our farm production is elastic

but only in one direction—upward. One-third higher than before the war, it requires sustained domestic employment, plus a large, soundly financed world trade. We can have these necessities at a price in terms of rational economic policy. We shall have to be prepared to maintain abundance in every phase of our economic life if we are to maintain abundance in agricultural production.

Slump After First World War

Some farmers and farm leaders worry because they recall the prosperous situation agriculture experienced during and immediately after World War I; they remember that the early 1920's saw a sharp recession, and that a brief recovery for agriculture in 1929 was followed by a profound and lengthy slump. This background makes them distrust the present position. They are conscious of their technology, which in recent years has expanded their production faster than ever. They do not expect the insatiable demands of wartime and early postwar years to continue indefinitely, and they want some assurance that markets and consumer buying power will not be allowed to decline excessively for lack of rational economic policy. They hope to avoid an extreme swing of the pendulum, such as might result from a new break-down of world trade or from unemployment here produced by prices out of line with buying power. Farmers know too that high over-all figures of production, consumption, and income may obscure some bad rural situations. Noncommercial or subsistence-type farmers comprise more than one-third of all our farmers and need help of another kind than that directed simply to the maintenance of prices.

Short-run agricultural problems, such as shortages in machinery, insecticides and fungicides, fertilizer, containers, and other supplies are clearing up. Caused by the war, these shortages can now be expected gradually to disappear. Other transitional problems, notably the reduced need that can be expected for war-expanded commodities like dry beans and certain oil crops, offer no serious difficulty now. In most cases the demand for such commodities is still strong; and reduction of demand for some war-expanded crops will find agriculture able and willing to make land use shifts. With *total* demand high, the problem of changing the composition of the farm output is manageable. But long-run problems give serious concern, because heretofore they have proved stubborn.

This country is making progress, though not fast enough for the need, in the conservation of soil, water, range, and forest resources. It is applying science to farming as never before and achieving corresponding miracles in food processing and distribution. In price policy and in maintaining a balance between production capacity and market outlets, however, it is still groping. No firm world-trade program has been devised. It has heavy unfulfilled responsibilities in assuring permanently good national nutrition; in the provision of rural facilities for health and education; and in rural electrification, rural housing, and other means of adequate rural living. Such long-run problems need treatment separately in many respects, but they have an important common feature. They all have economic roots and tie in with farm production and marketing.

Effective action on problems of nutrition, conservation, and rural facilities depends fundamentally on what the Nation does about markets and prices. Good nutrition presupposes consumer buying power; conservation presupposes farm prices that will exempt farmers from need to mine the soil; the provision of adequate rural facilities for health, education, and housing presupposes adequate rural incomes. Agriculture desires, as far as possible, to meet its own charges for public services. Without adequate markets and proper stabilization of agricultural prices, farmers cannot do much along the lines mentioned. Their basic problem is to increase the volume and reduce the cost of their production and have a full market for full production continuously.

Expansion of Nation's Markets

But the question of markets and prices for agriculture is just an aspect of a still larger question—how may the country expand its markets *generally*, in line with its advancing production power. Manufacturers as well as farmers face this problem. The answer must serve the town as well as the country; otherwise, it will serve neither. The solution must create an expanding world economy; and though the formula is vague, it has the merit of emphasizing the fact that the world must not again lapse into economic isolation. After the last war we in this country thought we could solve our economic problems all by ourselves and with that in mind practically took the lead in developing the self-containment way of life. This time, we are not withdrawing from the world as we did after the First World War.

We can gage the market need by comparing agriculture's position in the prewar years 1935–39 with its position today. Before the war, in a period mainly of depression, United States civilians consumed 97 percent of the available food supply; exports absorbed the remaining 3 percent. In the war years (1941–45) United States civilians consumed only 84 percent of the supply, though food consumption per capita increased as also did the population.

This was because the total food production increased greatly; specifically, as mentioned, by about one-third. Nine percent of the wartime supply went to the United States military forces and 7 percent in lend-lease and other exports. Last year, the first full year of peace, military needs were smaller, and United States civilians received about 90 percent of the food supply. The remaining 10 percent went in the proportion of 2 percent to our armed forces and 8 percent in shipments abroad. Exports were the largest the country had ever made. Moreover, the comparison here is between boom time and depression time. We can only guess what the balance between production and domestic consumption would be in a recession year.

Even a considerable decline from the present abnormal level of farm exports would not create a serious surplus problem, so long as the domestic consumption remained high. It would not be safe, however, to count on that. Foreign trade and home trade usually have their ups and downs together. A fall in the agricultural exports might have a counterpart in our industrial export trade, and consequently

in industrial employment. Even with an export slump confined to agriculture, farmers would have a problem, particularly in cereals, tobacco, lard, certain fruits, and possibly cotton. Briefly, the situation would oblige it either to regain an export trade more than twice as large as that of the prewar years or to get greatly expanded domestic consumption.

We can state the problem in a slightly different way. In 1946 lend-lease and relief shipments absorbed about 5 percent of the current food supply, plus an additional quantity taken from domestic stocks. Commercial exports took 3 percent. Military takings, not considered exports at all though of course they involved shipments overseas, were down almost to one-fifth of the wartime peak and as mentioned took only 2 percent.

After recovery in agriculture and the disappearance of the need for *noncommercial* United States food exports, our task may be difficult. Unless domestic consumption expands materially, we shall want a market abroad for approximately 8 percent of the total supply as compared with only 3 percent before the war. Note, too that the 8 percent will apply to a production one-third greater. Moreover, it assumes full employment and high consumption in the United States. In a slump, with domestic consumer-buying power diminished, the export proportion would have to be still larger, or agriculture would smother under surpluses.

Minor Fluctuations Unavoidable

Farmers, like other producers, realize that ups and downs in business conditions are normal and unavoidable. It does not wholly surprise them, for example, to hear that economists think a moderate recession may develop. Such customary fluctuations in employment, production, prices, and consumer demand present no insurmountable problem to the farmers. It is depressions such as that which developed after World War I, especially in the 1930's, that farmers really fear.

Naturally, therefore, farmers distinguish sharply between minor fluctuations in the business cycle and major depressions; they know that if another major depression develops thoughts will turn again to the interwar type of farm-relief program, with its crop limitations, crop holding, marketing quotas, price-supporting loans, and export subsidies. I shall attempt no forecast; but I shall emphasize a difference between the national response we are making now to postwar problems and the response we made to similar if lesser problems after World War I. I believe that if we continue in our present course, which keeps us in rather than takes us out of the world economy, we shall find it easier to avoid a major depression, and consequently to avoid agricultural programs of the type we found essential in the 1930's.

Policy After World War I

Let us look at what we are doing now against the back drop of what we did after World War I. As everyone knows, our policy consisted then of a gradual withdrawal from the world economy. We hoped to escape the influence of unfavorable economic developments

abroad. We did not succeed, but on the contrary contributed to a worsening of the depression, which hurt the United States as much as it did the other countries. Our attempt to isolate ourselves had a counterpart in foreign countries, many of which adopted drastic measures to reduce their imports of farm products and other goods. The effect was particularly harmful to American agriculture. The United States was of course not responsible exclusively for this world-wide growth of economic nationalism; but for almost a decade and a half it did nothing to stem the tide. Vainly it sought relief within itself.

Major steps in our self-isolating process were the import Tariff Acts of 1922 and 1930. These measures though intended simply to shut out imports had equally the effect of stifling export trade. Foreigners could do less selling here and consequently had to do less buying here. Temporarily, we masked the effect of the tariff increases by doing large-scale foreign lending; in other words, we financed United States exports with our own money instead of letting importing countries pay with goods and services. Eventually, however, the lending ceased to work as a means of stimulating our export trade. Because of the high risks involved, the loans carried high interest and repayment charges, which soon became an excessive burden on the borrowing countries.

Moreover, toward the end of the 1920's the United States became a greater importer than it was an exporter of capital. It was taking back some capital, and also taking in some frightened foreign capital. In the 1930's this country received large sums from abroad, though not enough to meet its claims for interest and repayment in full. Necessarily, under such conditions, our exports dwindled. In fact for the 7-year period 1931–37 our exports exceeded our imports of goods and services only slightly. Briefly, the isolating policy was working—seriously to our harm.

In 1934, however, the Nation adopted an important policy aimed at the return of the United States into the world economy. This was the Reciprocal Trade Agreements Act, which foreshadowed our present broader policy of participation in world affairs. Under the Reciprocal Trade Agreements Act the United States concluded 28 trade agreements with foreign countries; but the outbreak of World War II cut their operation short. The important agreement with the United Kingdom, for example, was in effect only briefly before that war. Various circumstances, such as Europe's political uncertainties, hampered other agreements. Meantime, exchange controls and other devices adopted by many countries to safeguard their depleted foreign exchange greatly reduced the success of the reciprocal trade agreements.

The Trend Now

During World War II this Nation planned to broaden its program for liberating world trade; simultaneously, it took the initiative in establishing an International Monetary Fund and an International Bank for Reconstruction and Development. After the war, it launched into world-food relief, and gave other indications that it recognized a responsibility for world healing. If we continue to fill our place in the world economy, instead of pulling out of it as we

did 30 years ago, the chance of avoiding major depression will be better.

The purposes of the Monetary Fund and the International Bank are hopefully significant. This country has subscribed 2,750 million dollars to the fund and 3,175 million dollars to the bank. Both agencies have begun operations; their financing facilitates exports from the United States to many countries that need our products as well as exports from other world sources of supply. This country also assists foreign countries through its Export-Import Bank, whose lending authority was increased in 1945 from 700 to 3,500 million dollars.

In addition, the United States Government makes some loans directly to foreign countries, such as the 3.7 billion dollar loan to the United Kingdom. Granted on terms much more favorable than those attached to our foreign loans after World War I, the current lending should burden the borrowing countries far less. Also highly significant of the changed attitude of the United States toward the world economy is the fact that this time no large war debts to us hamper the restoration of peacetime conditions. Lend-lease cancellations have reduced our claims tremendously.

Problems of Expanding World Economy

Some important problems in connection with our effort to help in building an expanding world economy remain to be solved. We have agricultural price-support commitments, provided by Congress, which to some extent complicate the program for the lowering of trade barriers. Limitation on imports of some commodities and export subsidies are devices designed to offset the effects of maintaining domestic prices above world levels. This Nation's proposals for an Expansion of World Trade and Employment, which have been the basis of international discussion in 1946 and 1947, take agriculture's requirements into consideration. They provide for the use of import quotas and export subsidies under certain conditions and aim at facilitating International Commodity Agreements.

Unsolved as yet is the old problem of how a big country like the United States can engage in foreign lending without providing liberally for payment by the debtors in goods and services. Failure to solve or at any rate to handle this problem could throw us back into economic isolation. The chance of avoiding a great depression then would be small. On balance, nevertheless, the United States is striving for world collaboration, and its efforts are the strongest single indication that long-time agricultural policy will not have to be a mere repetition of the interwar technique.

OUR NEED FOR IMPORTS

The world needs our goods and services more urgently than it did after World War I, but its ability to pay for them is smaller. Temporarily, we help it through gifts, loans, and other stopgaps, with as much emphasis as possible on the development of trade arrangements that ultimately will encourage reciprocal or two-way world trade.

Our exports exceed our imports tremendously at present, but all authorities agree we cannot maintain a huge so-called favorable trade balance indefinitely. We do not want the disparity to decline through an over-all drop in exports, though it might not hurt to let some items drop off heavily. But to cut the export trade would land us in depression.

The other way is much better—to accept an increase in our imports. This, of course, is not a simple problem. In order to digest more imports the United States must either reduce its production or increase its consumption; and the second procedure, though obviously the more desirable, is difficult. Our program for world trade improvement shows, however, that higher consumption levels are really the only solution for this problem. That program contemplates an increase in this country's imports as well as in its exports. Unquestionably, the advantages will offset the draw-backs.

In 1946 United States exports of goods and of such services as shipping and catering to tourists totaled 14.2 billion dollars. Its imports totaled only 6.4 billion dollars. This disparity meant that 55 percent of our 1946 exports were paid for by means other than imports; such as shipments of gold to the United States, drafts on foreign-held dollar balances, and, above all, by loans from the United States. It is unlikely the situation will improve in 1948. In fact, other countries will probably need financial assistance from the United States for some years. Essentially, nevertheless, the situation is a temporary one. American farmers should realize that as production recovers in Europe and Asia the foreign demand for their products will decline. In the long run, the mainstay of our agricultural export trade must be an increase in this Nation's imports, without which the supply of dollars to foreign countries must inevitably dry up. Hence the problem of expanding our imports, by means which will not disrupt the domestic economy, is of paramount interest and importance.

The Practical Approach

As a practical approach, consideration might be given to increasing imports of goods which will not force drastic or sudden production adjustments or serious reduction in producer prices or incomes, which will not displace large numbers of workers more rapidly than they can be reabsorbed, and which will yield advantages at some points in the economy sufficient to offset the immediate disadvantages.

Several types of imports can be expanded without disrupting the domestic economy. These include services, primarily tourist expenditures abroad, and secondly shipping; important minerals and metals not produced in sufficient quantity domestically; products of tropical agriculture; and the industrial specialties of foreign countries. Some agricultural products can be imported to supplement insufficient domestic production. Within the fields mentioned, imports both of agricultural and industrial commodities could be expanded without harm. How much imported merchandise we can absorb without disrupting our economy depends largely on the domestic economic activity. High production and purchasing power normally bring rising imports, especially of raw materials. Well-maintained employment and living

will simultaneously increase our import needs and provide foreigners with dollars to pay for our exports.

Our known commercial reserves of some important minerals are quite short. Future discoveries are uncertain, as shown by the recent considerable decline in prospecting. Mineral resources, of course, are nonrenewable and richest sources tend to be used first. Figures recently published by permission of the Bureau of Mines compare commercial reserves as of 1944 with the 1935–39 annual rate of use. Estimated reserves, expressed as "years' supply remaining," are as follows for some important minerals:

Magnesium, indefinite; salt, indefinite; bituminous coal and lignite, 4,300 years; phosphate rock, 805; molybdenum, 422; anthracite, 195; potash, 117; iron ore, 111; sulfur, 55; natural gas (based on proved reserves only), 48; fluorspar, 40; copper, 34; zinc, 19; petroleum (based on proved reserves only), 18; cadmium, 16; gold, 14; lead, 12; silver, 11; bauxite, 9; vanadium, 7; antimony, 4; tungsten, 4; platinum, 4; mercury, 3; asbestos, 3; manganese, 2; chromite, 1; nickel, 1; tin, 1; and industrial diamonds, quartz crystals, flake graphite, 0.

In some cases remote or speculative resources of considerable magnitude exist in addition to the known commercial reserves. New processes, higher prices, or other factors might make these remote reserves available. Stock piling of imported critical minerals might be desirable. This includes consideration of national security, and of price stabilization as well.

WORLD FOOD CONDITIONS FOR 1947–48

The food situation for 1947–48 in many parts of the world is more serious than in either of the past two seasons. Delayed spring planting and summer drought caused serious reduction in the United States corn crop which more than offset the increase in the wheat crop. The 1947 wheat production in the principal importing countries is expected to be considerably smaller than in 1946. The deficit in western European countries alone is expected to total over 200 million bushels. In addition, western Europe had a very dry summer which greatly reduced the production of hay, potatoes, and other root crops and dried up pastures. Sharp reduction occurred in the output of dairy products and there was some liquidation of livestock.

Production of cereals in the Soviet Union and other eastern European countries in 1947 was somewhat larger than in 1946 and seemed likely to permit some exports, though not enough to offset the lower production of western Europe even if these supplies actually are exported.

Prospects for the 1947–48 crops in the Far East indicated a slight improvement in this area for the coming year, but rice production in the surplus-producing countries was still far below prewar and exportable supplies were only about one-third of the prewar average. In consequence, the Far East required large imports of bread grains from outside areas.

In the Far East food supplies were still very low in early 1947 though a rice crop larger than that of the previous year had been harvested. Supplies of rice available for export were only about

one-fourth the prewar average. This meant that the rice-deficit countries in the Far East would have to continue obtaining their food imports from the United States and other food-surplus countries outside the Orient. The expected increased requirement in the Orient, along with the continuing heavy European need, indicated that the food-import requirements of deficit areas during the second half of 1947 would be much larger than in the last half of 1946 and possibly larger than the high requirements of the first half of 1947.

Financing Problem for Shortage Areas

In the early months of 1947 the problem of financing did not prevent deficit countries from getting their allotted supplies. With the expiration of UNRRA, however, the situation changed. Several of the countries that had previously got relief shipments had to make other arrangements for financing their food import needs. This foreshadowed important changes in the composition of the world's food export trade. Paying countries restricted their purchases as much as possible to the less expensive foods. This adversely affected world exports of dairy products, meats, fruits, and butter but maintained the demand for grains, vegetable oils, and lard.

Dependence Upon Imports

Prospects for consumption levels in continental Europe in 1947–48 depend largely upon imports. In the 1946–47 season food production for the Continent as a whole rose to between 85 and 90 percent of the prewar average. Supplies of domestic origin were supplemented by large imports which included some 12,000,000 short tons of grain for food, more than 500,000 short tons of fat for food (including oil equivalent of oilseed), about 200,000 short tons of sugar, and some dairy products, meat, and pulses.

Food production for 1947–48 is expected to be less than 85 percent of prewar volume. The severe winter of 1946–47, followed by a summer drought in much of western Europe, reduced 1947 grain production much below that of the previous year, curtailed the output of milk, and threatened the potato, sugar beet, and fall fodder crops. Some countries expected to increase the food use of domestically grown grain at the expense of feed. Temporarily abnormally heavy slaughtering may increase the meat output. But such increases cannot offset the reduced output of food crops and dairy products in western Europe.

Probably the farm population will continue to eat at near last year's level; hence the decline in supplies for the nonfarm population, unless imports increase, will be greater than the decline in production.

Previous Year's Improvement (1946–47) Only Slight

Food conditions reflected the fact that only slight improvement took place during the 1946–47 production year, in spite of a world production gain in that season of about 7 percent. Because of the continuing effect, food production and consumption during 1946–47 requrie some description here. Stocks on hand were down enough to offset most

of the production gain. Fewer countries were in acute need of food; but several had to continue their already low rations. Fortunately much of the 7-percent gain in the world's total food output took place in the deficit areas. The most serious continuing shortages of food were in continental Europe, particularly in Rumania, Germany, Austria, and Italy. Serious shortages existed also in parts of the Soviet Union and in the food-deficit countries of the Far East. Elsewhere throughout the world the consumption of food was about equal to the prewar average or above it. In a number of the food-surplus countries the consumption of food was at a very high level, owing to high levels of industrial activity.

Wide Variation by Regions in Europe

Food conditions in continental Europe in 1946–47 varied sharply from one region to another. In parts of Rumania actual famine prevailed. Failure of the 1946 corn crop was widespread as a result of drought, with Moldavia and some other provinces hurt disastrously. Food shortages were acute also in Germany, Austria, and Italy. In the British and American zones of Germany the normal consumer ration was raised in October 1946 to 1,500 calories.

Fully met, this ration with the supplements for workers and the "off-ration" addition would have meant an average per capita nonfarm consumption of about 2,100 calories. But controlled supplies were not large enough to cover the ration requirement, low as it was. Rations actually distributed to normal consumers in the winter of 1946–1947 fell short of 1,550 calories daily in many parts of the British zone and in the spring averaged less than 1,200 calories daily in both the British and American zones. Conditions were somewhat better in Austria, though there, too, average per capita nonfarm consumption was below 2,000 calories daily in 1946–47. In Italy, where the ration of bread and alimentary paste was reduced in December 1946, the average per capita nonfarm consumption was at much the same level as in Austria.

Elsewhere in continental Europe the nonfarm food consumption in 1946–47 averaged 2,000 calories or more for each person daily. Food supplies in Poland and Hungary were considerably larger than those of a year earlier, but lack of effective controls probably prevented the nonfarm intake from rising above an average of 2,000 calories. The average in Greece, Spain, and Portugal was apparently not much higher. Other countries in continental Europe fared comparatively well. Thus, nonfarm consumption in 1946–47 in France averaged from 2,300 to 2,400 calories per person per day, in Belgium, the Netherlands, Norway, Switzerland and Czechoslovakia from 2,500 to 2,700 calories, and in Sweden and Denmark over 2,800 calories.

Russia's Production in 1946–47

Agricultural production in the Soviet Union for 1946–47 was well below prewar, and rationing continued with wartime severity. Late 1946 brought reductions in bread rations and higher prices for rationed goods. Drought in 1946 harmed crops in the important south-

ern and central regions, particularly spring grains such as barley, oats, and corn, and also sugar beets and sunflower seed, the country's most important source of vegetable oil. Bread grains, largely winter-sown in most of the drought area, fared better. Grain yields in outlying areas in 1946 were relatively good or satisfactory but the shortage of transportation facilities limited the amount of food products that could be shipped into the deficit areas.

The British Position in 1946–47

In the British Isles changes in the supplies of various foods resulted for 1946–47 in a slight decline in caloric value as compared with 1945–46, and to a considerable decline as compared with the levels maintained during the war years. Bread rationing was introduced. The Government promised to remove this rationing as soon as possible, but by mid-1947 had not accumulated sufficient stocks. The wheat crop of 1946 in Great Britain was poor and the country entered the winter with an inadequate reserve. Lower rations of bacon and cheese were an added hardship. Supplies of fats were down to a point that necessitated holding the weekly ration at 3 ounces for butter, 3 ounces for margarine, and 1 ounce for cooking fat. Meat supplies declined partly as a consequence of a packers' strike in Argentina; but distribution of eggs was higher than in the previous year and improvements were reported in the supply of fruits, fish, poultry, milk, and certain vegetables.

Crisis Protracted in Far East

Food conditions in the Far East were difficult during 1946–47 despite increased production in many areas. Acute food shortages preceded the first rice harvest of 1947 in certain southern areas of China and preceded the harvest of wheat and other winter crops in north China. Food conditions were favorable in central China. Total crop production in China in 1946 was nearly equal to the 1931–37 average. Small carry-overs, regional deficits, and a shortage of transportation made deficits unavoidable in some areas, especially Kwangtung, Kwangai, and Hunan provinces of south China. In Manchuria, a reduction of crop acreage, caused mainly by shortages of fertilizer, draft animals, human labor, and irrigation facilities, resulted in decreased production of nearly all crops in 1946.

In Japan, food production for the 1946–47 season was higher than in 1945–46, and yet far short of meeting the recommended daily requirement of 1,550 calories per normal customer. In fact the domestic production alone would provide probably not more than 1,200 calories per normal customer. Conditions better than those of the previous crop year were reported for India, Ceylon, and Burma. In Siam, Indochina, and Malaya, conditions were still serious. Critical conditions prevailed also in the Netherlands Indies.

UNITED STATES FOOD EXPORTED IN 1946–47

In the year ended June 30 last this Nation exported more than 19 million long tons of grain and other food, mostly to countries left hungry by the war and its aftermath. This was more food than

any country had ever before shipped abroad in a single year; it was significantly more than the United States itself exported in the immediately preceding marketing year, though 1946 saw the culmination of the President's nine-point world relief program.

Main factors in the new achievement were another record harvest in 1946 and highly effective cooperation among farmers, railroads, transportation companies, and Government agencies. Aided by the International Emergency Food Council, with its allocation arrangements, the Government was able to send the food to the areas of greatest need. Huge though the shipments were, they did not deprive the people of the United States of essential food supplies. Civilian consumption per capita continued here at the high level of recent years through a combination of high consumer buying power and abundant farm production.

It is important to bear in mind, however, that our exports plus those of other food-surplus countries did not fully meet the needs of war-devastated countries. Millions of people in both Europe and Asia still were hungry, and looking to the food-surplus countries for continued food relief. Accordingly, the President asked the Cabinet Committee that he had appointed on World Food Programs to carry on in 1947–48 with the continued help of the Coordinator of Emergency Export Programs. The American people could not pause in their efforts to lessen hunger in war-stricken countries.

Where the need was greatest in 1946–47 appears in a statement issued by the Cabinet committee on the destination of the exports. In the 1946–47 marketing season the zones occupied by American and British military forces in Europe received 3,210,268 long tons of United States food. The United Kingdom received 1,700,446 tons; Italy received 1,464,286 tons; France and French North Africa, 830,357 tons. All other European countries combined received 4,491,517 tons. Exports to the Far East provided 1,708,482 long tons of American food for Japan and Korea under the American military feeding program. Exports to India totaled 1,027,232 tons; to the Philippines, China, and Netherlands East Indies 1,030,357 tons. Latin-American republics received 2,050,000 tons, and other countries 1,671,875.

Food Grain the Export Mainstay

As in the previous year food grain was the backbone of the export program. Easily shipped and stored, and high in food value in relation to the cost, food grain is of supreme importance in relieving the world food crisis. Wheat was again central in the task. Altogether the grains, including rice, provided slightly more than 15 million tons of the total shipments. Of this total, wheat and flour, calculated as wheat equivalent, accounted for 10.6 million tons. Corn, oats, barley, rye, and grain sorghums accounted for slightly more than 4 million tons; rice for half a million tons. Other shipments included 501,786 tons of dairy products, 213,839 tons of fats and oils, 231,696 tons of meat, and nearly 3 million tons of other foods such as dry beans and peas, eggs, fish, sugar, potatoes, vegetables, fruits, and nuts.

It was evident one year ago that many countries would continue to need large food imports. Food stocks were low in Germany, Austria,

Italy, and Rumania; also in oriental food-deficit areas. Hope of local replenishment was faint, because production facilities such as work animals, implements, fertilizer, and even seed were scarce. Agriculture suffered also from disrupted transport and distribution. Our food exports exceeded 17 million long tons in 1945–46, and prevented widespread starvation or malnutrition. But the service would have been lost without a follow-up; world agriculture had scarcely begun its recovery. Fortunately, the food situation here was again favorable in contrast with the desperate need abroad. In 1946 farmers harvested 1,156 million bushels of wheat, and 3,288 million bushels of corn—both crops all-time records. Production of many other crops, and also of most livestock products, was above average.

Success in the effort to move supplies to the points of need demanded many-sided cooperation among private and public agencies. Farmers still strove for full production, as protection against depletion of stocks; processors used their equipment, supplies, and manpower to the full; distributors and transportation agencies teamed up for efficient handling of rolling stock, storage space, and other facilities; official agencies financed and timed procurement operations. The Office of the Coordinator of Emergency Exports got help from the Office of Defense Transportation, the Maritime Commission, and other agencies in efforts to avoid delays. Along with shipments of food, this country shipped machinery, fertilizer, and other means of production. All this was an expression of the American economy at the cooperative peak of its efficiency.

Relief Tasks Still Unfinished

Looking ahead, we discern world relief tasks still unfinished along with uncertainties as to what we shall be able to spare. Against another tremendous wheat crop, we have to set the fact that 1947 feed-grain production is relatively small. Grain allocations announced for the first months of the new crop year showed we intend to do our share. They call for shipments at maintained high levels. These early allocations reflect our new record wheat crop, estimated at about 1,400 million bushels. But to maintain record grain shipments this year in the face of greatly reduced supplies of feed grains it will be necessary for all of the people of the United States to conserve grain in every way possible.

All this underlines the need for war-stricken countries to increase their own farm production. Our help to them for this purpose has been substantial and will continue. For example, the United States Army this year (calendar 1947) is supplying fertilizer material containing about 143,000 long tons of nitrogen to the occupied zones of Europe, produced in plants under Army jurisdiction. Nitrogenous fertilizer has gone to other devastated areas, in line with recommendations by the International Emergency Food Council. Exports of farm machinery will increase. Farm recovery abroad will lessen the world outlet for some United States farm products. But currently our exports exceed in volume what we can maintain on a long-run basis.

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Ultimately, this Nation in farm as well as nonfarm business will prosper more surely from restored self-help abroad than from abnormal requirements for relief.

FOOD PRODUCTION IN FOOD-DEFICIT COUNTRIES

Last July the Food and Agriculture Organization of the United Nations held a special cereals conference in Paris. Called at the request of the International Emergency Food Council, after a recommendation by the Secretary of Agriculture, this meeting considered world food distribution from the export-import standpoint as a whole, and the problem of more effective use of domestically produced supplies in deficit countries. It knew the world grain emergency would continue to some extent pending restoration of grain production in the grain-deficit countries.

Fully to bridge the gap with exports and imports, even on a short-run basis, was not feasible. Apart from the sheer difficulty of getting a sufficiently large export supply, scarcity of transportation and scarcity of other facilities ruled out dependence exclusively on shipments from surplus to deficit countries. Following the UNRRA wind up, purchasing power was an additional stumbling block. Grain-exporting countries presented facts as to their probable grain exports during the 1947–48 marketing year. Grain-importing countries pondered possible reductions in their requirements. With facts from both standpoints available, the conference sought to establish realistic food estimates.

This country's representatives recalled that in the fall of 1945 the world estimated a pressing need for about 35 million tons of grain exports. Exportable supplies in sight amounted to only about 25 million tons. By July 1946 the United States had scraped together and exported 11,747,000 long tons of grain. It had to reduce its production of livestock products, reduce its own consumption of cereals, offer special incentives to the farmers, and deplete its reserve stocks of wheat to the lowest level in two decades—about 100 million bushels. Other exporting countries sharply reduced their supplies. Accordingly, the world entered the 1946–47 crop year with very little grain in reserve. Excellent United States grain crops in 1946, with prospects at the year end that the 1947 wheat crop would be large, enabled the United States to lift its export goal for 1946–47 beyond the expectations. But increased shipments again brought carry-over stocks to a very low level.

Against this background the United States delegation sketched the export prospects. Low carry-over stocks of wheat had a big offset in another record United States wheat crop. Even after allowing for an increase in carry-over stocks to a safer level, it seemed we might still be able to export more wheat than we exported in 1946–47. As mentioned already, however, the wheat export possibility for 1947–48 remained subject to the threatened outlook for other grains, especially corn. Total grain output of the United States in 1947 seemed likely to be smaller than that of 1946. These facts about the United States position along with comparable facts from other grain-exporting countries indicated clearly that avoidance of a third year of intense

crisis and suffering in the grain-importing countries would necessitate careful management of rations, along with increased production and collection of grain from their own farms. Thus informed, the Conference stressed the importance of greater production and better distribution in the importing countries.

Financial and Price Problems

In addition, the Conference considered financial and price problems. Speakers pointed out that even in the United States the world shortage of goods creates an inflationary problem. Yet importing countries pay less for wheat in the United States than in any other country with one exception. This fact, beneficial for the world at large, creates problems. It would be bad for world recovery in general and bad for each nation to have an inflationary demand turned loose in full force on the price structure of the United States, and particularly on the grain-price structure. Hence, the American viewpoint emphasized the importance of delivering grain at moderate prices. It asked the importing countries to help by limiting the intensity of their demands. This would not necessarily require any further lowering of rations. Better collection and management of grain supplies, plus increased grain production, could have the same result in a greater measure and with benefit to diets.

Study of means to increase grain production in the grain-deficit countries drew attention to the importance of nitrogen, in turn dependent largely on the production of coal. Under present conditions it is fully as difficult to provide coal and consequently nitrogen as it is to provide food supplies. This country advocated an international approach to the nitrogen problem, through which all countries that produce nitrogen fertilizer might plan their operations together. Such a program would involve sacrifices and require prearranged financial and technical cooperation; but it would have better prospects than any unsystematic effort. Moreover, the hungry countries have no other long-run solution of their food shortage. In fact, as stated, imports do not fully meet their needs even temporarily. Farm recovery in the deficit countries is partly an urban problem. Among other things it depends critically on nitrogen, itself a product of complicated industrial plans and readjustments. Long-run aspects of the world food problem require a greatly increased contribution from *industry* to agricultural recovery, and this means principally greater collaboration between industry and agriculture in the critical food-shortage areas.

THE FOOD AND AGRICULTURAL ORGANIZATION

The problem of developing production to meet long-term world needs looms larger. World population is increasing by 15 to 20 million each year, and in the United States and other high-producing countries demand is at a peak that corresponds with employment and wages. People want more and better food than before the war. On the other hand, despite the current pressure on supplies, the prospect of economic surpluses worries producers. Shortage of international exchange in

needy countries may inhibit exports and imports, and the recovery of farm production in war-damaged areas that formerly satisfied their own needs will eventually reduce the import demand. In nonfood products, the synthetics and other man-made materials disturb old patterns of production, as in the case of rubber and silk, and millions of small producers may find themselves without a livelihood.

The situation is far too complex and difficult for individual nations to attempt to deal with it by themselves; indeed, unilateral action for the benefit of one country may adversely affect other countries and, by increasing international tensions and difficulties may recoil on the initiator. Nor can the Food and Agriculture Organization acting alone deal adequately with these problems. Economic action is necessary in which FAO, the International Bank, the Monetary Fund, the proposed International Trade Organization, and other appropriate agencies will all play a part and complement one another.

This is difficult in the present embryonic stage of international relations, yet it must be done if we are to escape worse disasters than the last world war and the economic collapse that preceded it. There is no other method, at present, than unremitting efforts by governments, through consultation with one another, to discover and apply suitable techniques for common action in the fields of production, trade, and finance.

It is to such pioneering work that the Food and Agriculture Organization, under the leadership of Sir John Boyd Orr, has been addressing itself. Chief effort at the moment centers in equipping the organization to deal more effectively with the vast problems it was set up to handle. The Preparatory Commission on World Food Proposals, headed by Lord Bruce and including delegates from 17 countries and observers from many others, met in Washington for 3 months (October 1946–January 1947) and drew up recommendations primarily—

(1) To establish a Council of FAO (or World Food Council), consisting of official representatives of 18 nations, which would meet at suitable intervals between the annual sessions of the FAO Conference, keep the world situation under continuous review, and apply policies set by the Conference to current problems; and

(2) To turn the Conference of FAO into a full-scale review of the world situation and outlook in food, agriculture, forestry, and fisheries, at which national programs and plans would be examined annually and mutual adjustments worked out to fit world production more closely to world needs and to reduce economic conflict between nations.

Proposed FAO Amendments

The United States Government proposed amendments to the FAO constitution which would put the Preparatory Commission's recommendations into effect.

In effect, the Preparatory Commission proposals are a modified version of those made by Sir John Orr in 1946. Whereas Sir John had suggested the setting up of a World Food Board with funds and authority to establish world stocks of major agricultural commodities and mitigate violent price fluctuations by direct buying and selling,

the new proposals would leave actual operations in the hands of governments.

The proposed FAO Council would serve in an advisory capacity, initiate investigations, set up study groups, and make recommendations. It would provide FAO with a central body empowered to act on behalf of governments, which the organization now lacks.

The Director General of FAO has proposed that if such a body is established, it should immediately assume the following functions:

(1) Consult with member governments to insure a maximum mobilization of food for human use in 1947–48, including the strengthening of food collection and food economy measures.

(2) Undertake the functions now performed by the International Emergency Food Council and continue international allocation of food and fertilizers in short supply. (The IEFC will go out of existence at the end of 1947 unless its life is extended by action of governments.)

(3) Take action to accelerate the supply of materials needed to expand the 1948 harvest, including the coordination of needs and, if necessary, the making of special arrangements for procurement.

(4) Assist member governments in promoting longer term nutritional and agricultural development programs for individual countries and for regions and collaborate with the United Nations and with various specialized agencies in regard to economic aspects of such development programs.

(5) Review agricultural, forestry, and fisheries commodity situations and where necessary promote joint activity among governments, meanwhile maintaining close contact with the Interim Coordinating Committee on Commodity Arrangements, which has been established pending the setting up of the proposed International Trade Organization.

Great emphasis would be placed on the long-term development of productive resources, not only in the crowded areas of the Far East but in Africa and Latin America, which are capable of producing far beyond their own needs. Attention would be given, through suitable international commodity arrangements, to protecting producers against violent price disturbances. The criticism of such arrangements in the past has been that they were likely to aim at curtailing production. In the framework of an expanding economy, commodity arrangements could be used to insure high production by providing special markets for temporary and local surpluses.

FAO Membership and Projects

Present membership in FAO is 48 nations; 3 more countries applied for membership at the Geneva Conference. Technical divisions have been established on agriculture, economics, and statistics, fisheries, forestry, and forest products, and nutrition, together with the nucleus of a division on rural welfare. National FAO committees have been organized so far in 34 member countries. A temporary European office has been established at the Rome headquarters of the International Institute of Agriculture, which has now been absorbed by FAO. Regional offices in Asia, the Middle East, and Latin America are

contemplated for the near future. Closer working relations have been developed with the United Nations, the specialized agencies, and various other intergovernmental organizations.

The technical divisions have started many projects and services for member governments. A mission sent to Greece to advise that country on the long-term development of food, agriculture, and related industries completed its report early in 1947. A similar mission went to Poland later in the year, technical advisers were sent to Venezuela, and missions are being considered for Hungary and for Siam. An International Timber Conference, convened in Czechoslovakia, worked out a program for meeting Europe's acute needs for increased supplies of timber. Representatives of European National FAO committees have held a series of meetings to work out common plans for dealing with problems of food and agriculture in that region.

A Rice Study Group met in India and drew up recommendations for international collaboration in increasing production and improving distribution of that staple food of the Orient. Many meetings of special technical committees have been held at which internationally known experts dealt with problems of animal health, plant and animal breeding, fisheries, forestry, human nutrition, and economics and statistics. Plans are well advanced for taking world censuses of agriculture, forestry, and fisheries in or about 1950.

INTERNATIONAL COLLABORATION IN AGRICULTURAL TECHNIQUE

Started long ago, agricultural collaboration between the United States and other countries has increased greatly in recent years, particularly since the end of the war. It is likely to increase still more, because the exchange of scientific and technical information is one of the cheapest, most productive, and most acceptable ways in which nations can help one another. Current forms of this cooperation include the establishment of intergovernmental agricultural stations and research projects, the sending of missions to foreign countries, the exchange of scientific and technical personnel, and the training of students in agricultural science and economics. Action along these several lines calls for brief mention in this report, since it suggests or forecasts patterns of development for the future.

Cooperation between the Government of the United States and other governments in the Americas has borne fruit in the establishment and operation of intergovernmental agricultural stations in Ecuador, El Salvador, Guatemala, Nicaragua, and Peru. Set up under a program initiated in 1942 by this Department's office of Foreign Agricultural Relations, the 5 stations mentioned now have more than 120 research projects under way. Cooperative research projects are being conducted jointly by this Department and the agricultural ministeries of several other American countries. The studies look for ways to increase the production of rubber, tea, coffee, cacao, kola nuts, turmeric, vanilla, cinchona, nutmeg, yam beans, abaca, sansevieria, jute, henequin, ramie, palm oil, calathea wax, lemon and citronella grasses, and many other crops. This Department provides

technicians, equipment, and other necessities, and shares the expense.

The collaboration extends beyond the problems of production, with mounting recognition that equal, if not greater, importance belongs to nutrition, rural living, conservation, public health, and other social values. Resolutions adopted by the Inter-American Conference at Buenos Aires in 1936 and at Lima in 1938 drew attention to these and other elements of rural sociology. Pursuant to these resolutions the United States Government has established an interdepartmental committee on scientific and cultural cooperation. Similar agencies in the Latin-American countries carry the work forward there. Action on many projects is under way. Another cooperative project, at present in the preparation stage, is an agricultural census of the Americas. It is planned for the year 1950. This Government will take part in the work, which should provide information of great value. Preparations include specialized training in the United States of statistical technicians from the other American countries.

United States Missions to Many Countries

Agricultural missions from the United States have visited countries of the Western Hemisphere, of the Middle East, and of the Far East. Sent in every case by invitation, the missions have consulted with the foreign agricultural authorities, made agricultural tours and surveys, recommended research projects, suggested lines of action for agricultural improvement, and in some cases offered programs for necessary administrative organization and procedure. Also, the missions have indicated ways in which the governments of the countries visited might collaborate more or less permanently with the Government of the United States, and have suggested what projects, personnel, facilities, and organizations would help. Some missions have suggested action programs to cope with emergencies. Usually the missions have drawn on trained agricultural personnel from State agencies and from private industry as well as from the Federal agencies.

Altogether, over a number of years, 17 agricultural missions from the United States have visited American countries. They have completed surveys in Bolivia, Colombia, Ecuador, Haiti, Mexico, Nicaragua, Paraguay, Peru, and Venezuela. Missions are now in Colombia and Panama. After World War II, this country sent an agricultural mission to the Middle East. It visited Egypt, Lebanon, Iraq, and Saudi Arabia, and drew up recommendations in cooperation with local experts and authorities. Chiefly the recommendations looked toward the improvement of agricultural practices, the provision of more healthful diets to low-income groups, and the raising of living standards in general.

Similar missions visited China and the Philippines. Jointly with members appointed by the host Governments, they studied long-range as well as immediate agricultural problems and made recommendations for comprehensive national agricultural programs and for the services required to implement them. Besides the mission to China, some individual technicians from the United tSates visited them by

invitation of the Chinese authorities and studied special problems—for example, the problem of designing the proposed gigantic Ichang Dam and power plant on the Yangtze River.

Foreign Technicians Invited Here

Conversely, the United States has invited foreign agricultural scientists, economists, and other technicians to study problems of production, marketing, and so forth in the United States. There is a double benefit. The visitors often throw a fresh light on American problems and simultaneously they learn from us. Such cooperation among the United States, the United Kingdom, France, and the Netherlands brought a wide range of knowledge and experience to bear on agricultural problems in the Caribbean area. The Bureau of Reclamation accepted sponsored visitors who wished to study irrigation; it also accepted some foreign engineers for in-service training. Training programs for foreign students of agricultural science and economics have been under way in the United States for several years, under the direction of the Office of Foreign Agricultural Relations in cooperation with other governmental agencies both Federal and State and in cooperation also with foundations and private institutions.

Our agricultural cooperation with other countries includes an important program started in 1942 by the Institute of Inter-American Affairs. This agency is a corporation of the United States Government, founded especially to assist other American republics in alleviating agricultural hardships caused by the war. In each country aided it established a special Inter-American Cooperative Service, financed and also staffed by the United States Government and the host government. The two governments adopted cooperative programs and administered them jointly, usually under the direction of the chief United States technician. Projects have been completed in land utilization, livestock and pasture management, food storage and distribution, home improvement and nutrition, and training and education. The countries aided include Brazil, Paraguay, Peru, Venezuela, Costa Rica, El Salvador, Haiti, Honduras, and Panama.

PRODUCTION GOALS ADOPTED FOR 1947

Farm production goals submitted by this Department in November 1946 for review by State USDA councils called for another year of production at near wartime levels. In fact the acreages requested exceeded the actual planted acreages of 1946. High production was again necessary to meet a strong domestic demand based on high employment and to help in overcoming food shortages abroad. It was necessary also to replenish our stocks of many commodities, which had been depleted by the huge demands of war years and the immediate postwar years. Another reason for setting the goals high was the necessity of allowing for possibly unfavorable growing weather. Review by the States of the recommended high goals, in the light of State and local conditions, resulted in very few changes.

As finally adopted early in 1947 the goals envisaged 356,893,000 planted acres as compared with 355,000,000 acres planted in 1946.

Average planted acreage in prewar years was 341,604,000. Increases requested over 1946 were greatest in cotton, flax, dry beans, soybeans, barley, and grain sorghums. Goals called in some areas for shifts from crops emphasized in the war years; elsewhere, the goals required more intensive use of land. In sugar and in fats and oils the goals sought the greatest possible increase in the domestic production, with a view to lessening this country's import needs and increasing the supply available to shortage areas abroad. Goals for potatoes, burley tobacco, and a few other crops not previously in short supply, were set in terms of estimated needs. A better balanced use of the truck-crop acreage was an important recommendation.

Beef cattle slaughter of about 34.5 million head was requested and spring pig production of 58 million head—about 11 percent above the 1946 spring pig crop. The suggested fall pig goal was almost 35 million head or nearly 13 percent above the fall crop of 1946. Goals for dairy products sought some slowing down in the rate of culling.

Goals proposed for soil-depleting crops were above the acreages considered desirable for proper land use and soil conservation. In fact the goals assumed a continued heavy drain on soil resources. Accordingly, this Department asked State agricultural authorities to study the recommended acreages carefully from the standpoint of efficient land use practice and if necessary to modify them. It advised growers of wheat and flax not to break sod or grassland unsuited to continue cultivation or likely when plowed to erode. It urged farmers generally to follow conservation practices as fully as possible, pending the return of world-food conditions that would favor permanent improvement in the balance between soil-depleting and soil-conserving crops.

UNITED STATES FOOD CONSUMPTION IN 1947

Food supplies for domestic consumption in the United States were about as large in 1947 as the previous record total of 1946, and were distributed more evenly throughout the year. Consumption per person was about 17 percent above the prewar (1935–39) average. Food prices at retail fluctuated considerably but became significantly higher in the later months. The demand for foods was exceptionally strong both at home and abroad. About the same proportion of the total food supplies went into domestic consumption as in 1946. Our sustained high production permitted heavy shipments to occupied areas and to our former allies.

Production of food in the United States was a new high record. Tremendous crops of the food grains were more than sufficient to offset a reduced output of vegetables caused by an unfavorable spring. The corn crop was short; but the effect of that was not felt at once. It will be more evident in 1948, when tight feed supplies will curtail livestock production. Mounting foreign production of some food items contributed to the United States food supply. Our imports of certain agricultural products, notably sugar and bananas, were larger in 1947 than in any year since the beginning of World War II.

The consumption of individual foods per capita differed somewhat from that of 1946. It was lower in chicken and turkey, fluid milk and

cream, canned fruits and fruit juices, fresh vegetables, dried beans and canned soups. There were some increases in the consumption of sugar, meats, eggs, cheese, evaporated milk, butter, lard, margarine, rice, and fresh fruits. Some foods continued to be in smaller supply on a per capita basis than before the war, but in most cases even these were more plentiful for United States consumption than in other years since the prewar period 1935–39. This group of foods included butter, canned fish, and sugar.

In nutritive value the food supply available to United States consumers in 1947 was substantially higher than before the war.

FOOD SUPPLY OF UNITED STATES CIVILIANS SINCE 1940

Since 1940, civilians in the United States have eaten more and better food than before World War II, though this country has sent enormous quantities of food abroad, and has experienced shortages of manpower and of farm machinery and other agricultural supplies. In 1944, when the war effort was at its peak, civilian consumption in the United States though about 10 percent above the prewar average accounted for only about 80 percent of the food disappearance. The remainder went in the proportion of about 12.7 percent to the United States military forces and 7.7 percent in lend-lease and other exports. This was possible because the food output was about one-third above the prewar level. Food supplies of civilians in the United States are continuing at the high level reached in 1946; they will probably hold there into 1948, even with food shipments abroad maintained at a high rate. Nevertheless, certain aspects of the nutrition situation forbid complacency.

Average supplies of most nutrients for United States civilians should be almost as high throughout 1947 as they were in 1946. Possibly the per capita consumption of fluid milk and cream will decline a little, with some small resulting decrease in calcium and riboflavin. Supplies of carbohydrates will be slightly larger, especially in the form of sugar. Supplies of thiamine, riboflavin, niacin, and iron will remain high as a result in part of the continued enrichment of grain products with these nutrients. It is not yet possible to forecast 1947 supplies of vitamins A and C, since these depend considerably on the production of fruits and vegetables. But we know that since 1935–39 the consumption of leafy, green, and yellow vegetables, and of citrus fruit and whole milk, has increased substantially. We have no reason to suppose it will fall off.

Yet we cannot gage nutrition exclusively from data on nutrients available. Such data are national averages, subject to very unequal distribution. Supplies adequate enough when viewed as averages do not prove that everyone has enough to eat. Satisfactory averages give no assurance that all groups, in all sections of the country, at all income levels, and at all seasons, can have good diets. Probably the distribution of the food supply was more even during than before the war. In the war years unemployment was absent and price controls, rationing, and other controls were in effect. The distribution may be less even now. We do not possess Nation-wide data for

various groups within the population. But reduced evenness in distribution is to be expected from the termination of rationing and from the removal of price-controls, with its resulting rise in living costs.

Another defect of the supply data as a measure of individual nutrition deserves attention. Supplies of nutrients daily available on a per capita basis fail to show the actual ingestion of nutrients; hence they are not directly comparable with the recommended dietary allowances of the National Research Council. Estimates of supply do not allow for the waste of nutrients, in the preparation of food and elsewhere; they do not reveal the seasonal shortages that always affect certain areas. Studies of family food consumption supplement the national averages of available supplies. Such studies in 1942 indicated a significant improvement then in family diets as compared with 1936. Nevertheless, about half the diets still failed to provide enough riboflavin; one-third were low in calcium; one-fourth were low in thiamine.

Low-income Groups

In 1945 a Nation-wide survey indicated that 20 percent of the families studied had an annual income of less than $1,000. In one southern county studied in 1945 about one-third of the white and about half the Negro farm families had money incomes of less than $500. In another State one-fourth of the white families had money incomes of less than $500; almost three-fifths had money incomes of less than $1,000. One-third of the white farm families and two-thirds of the Negro families in the first mentioned county had diets that provided less than two-thirds of the allowances recommended by the National Research Council for one or more nutrients. Needless to say, rising prices may affect purchasing power much as falling money incomes do.

Although diets have been better in recent years on the whole, many people still are not enjoying a high level of nutritional health. There are no accurate figures on the prevalence of dietary deficiency diseases in the United States but they are known to occur. In most cases they are mild and multiple in nature. Less is known about the incidence of suboptimal nutrition due to faulty diets but it is believed to be widespread.

Programs of three types are in effect to improve diets and living standards in the United States. One type embraces research to provide nutrition knowledge; another type endeavors to spread such knowledge and induce people to apply it; the third type actually helps consumers to meet adequate dietary requirements. Much indebted already to research, the Nation's nutrition requires additional study both of the physical and of the economic and social problems involved. We may conceive the research requirements as threefold: (1) As concerned with basic nutrition needs; (2) as concerned with the contributions different foods can make toward meeting these needs; and (3) as concerned with the factors that influence the kind and the quantity of the food consumption. Progress achieved already, though substantial, is possibly just a hint of what remains to be discovered.

Educational work in nutrition needs to be continued on a broader scale. Many families need information on how to select an adequate

diet, even if they have the money; this has been shown time and again, in surveys that have included families with ample funds. Many people with no reason to stint on food do not buy what they really need. The education program should assist such people to improve their food habits. As education approaches the lower income groups, the difficulty increases; for in this part of the population lack of adequate income complicates food selection. Not only is it more important, it is more difficult for the lower income family to spend its food dollar advantageously. Hence nutrition work in schools needs emphasis and also supplementation.

One channel for getting nutrition information to people is through home-demonstration work of the Extension Service. At the community level adult nutrition education is carried on also by Public Health and Welfare agencies, and the American Red Cross. Informal education programs through publications, by radio, and in meetings and motion pictures, can play an important role. In the war years nutrition education received much impetus, from a coordinated program initiated at the Federal level and developed through State and local nutrition organizations.

Various Nutrition Programs

Notable among aids to better nutrition is the national school lunch program. Started in 1933, this program now has a permanent basis in the National School Lunch Act of 1946. After its inception in 1933 when Federal funds were made available to pay labor for preparing and serving school lunches, the next big step came in 1935, when Federal legislation to expand markets for farm products made it possible for the Government to donate food supplies for school lunches. Then in 1940, a school-milk program, which made milk available in many schools at a cost of 1 cent for half a pint was added. In 1943, the Federal program became a cash indemnity system, with the Government authorized to reimburse local sponsors of the school lunches for part of the expense of serving a nutritionally adequate lunch. It is in this form that the National School Lunch Act of 1946 makes the program permanent. In addition, direct distribution of foods to schools has been continued.

Among other aids to nutrition should be mentioned home gardening and food-preservation programs. Encouraged by Federal and State agencies, and facilitated in many areas by the local authorities, such programs increase the food supply and improve the quality of the diet of many families. In the war years Victory Gardens produced annually about 8 million tons of fresh vegetables. Along with home preservation, which in 1945 for example included the canning by housewives of more than 3.4 billion quarts of fruits and vegetables, the garden movement fused perfectly with the nutrition goal, since it emphasized nutrients frequently deficient. Some 6,000 community food-preservation centers supplemented the home canning. Many schools used these centers to improve their school-lunch programs.

Much food is now being preserved by freezing. In July 1946 over 8,000 communities were being served by freezer-locker plants with a

capacity for 3¼ billion pounds of food. About 2½ million families benefited.

Meantime, the movement for enriching, restoring, and fortifying certain foods continues. Enrichment of grain products in 1945 furnished 17 percent of the available dietary supply of iron, 27 percent of the thiamine, 19 percent of the niacin, and 12 percent of the riboflavin. Not compulsory any longer by Federal authority, the enrichment of grain products is about the same as during the war years. Some 20 States require enrichment of white flour; some States also require enrichment of corn and certain other grain products. Most manufacturers fortify margarine; in 6 States that is compulsory. Additions of iodine to salt and of vitamin D to milk are frequently made.

THE YEAR'S PRODUCTION

Output of crops in the United States in 1947 was near the average of the 1942–46 period, the best 5 years in the history of our country. It was only about 5 percent less than the record set in 1946, on the basis of preliminary estimates. Although corn production was relatively small and held down the feed-grain total, food grains were produced in record volume. Hay, oilseed, fruits, sugar crops, tobacco, and truck crops ranged from above average to near record in volume. Only a few crops, in addition to corn, were below average. Livestock products reached a relatively high level, much above that of any prewar year, though less than that of any of the last 5 years.

Farmers met with unusual obstacles in an extremely adverse spring. Corn was the chief crop which could not overcome the early adversities. The outturn of corn, while only slightly below that of 1940, was the smallest since 1936. With barley and sorghum grain also below the average, and with only oats of the four feed grains above the average, the tonnage of feed grains was relatively small. The carryover from previous seasons was fairly large. Partly because livestock numbers on farms decreased, the supply per animal unit was only about 10 percent below the average of the previous 10 years, though higher than in most years prior to 1937. Hay was a larger-than-average crop and the carry over was large. Hence the supply of hay per animal unit was the most liberal of record, though much of it was of poor quality.

The season was favorable for winter wheat and for the first time the country harvested more than one billion bushels. Augmented by a relatively large spring wheat crop grown despite adverse planting conditions, the production of all wheat was about 1.4 billion bushels—a new record. Rice reached a new high mark. Rye production was one-third larger than in 1946, though only two-thirds of the average. Buckwheat production was well above average. As mentioned, total food-grain tonnage was the largest of record.

Oilseed production included relatively large outturns of soybeans and peanuts, the third largest flaxseed crop on record, and production of cottonseed one-third above last year's though below the average. Altogether, the oilseed crop yielded a tonnage about 11 percent above that of 1946 and one-fifth above the average.

Cotton acreage was about one-sixth larger than in 1946 and yields were better than average; production was more than one-third larger than in 1946 and nearly up to average.

Record crops included wheat, rice, pears, and sugar beets. Outturns of flaxseed, soybeans, hay, buckwheat, tobacco, peanuts, sugar beets, peaches, grapes, citrus fruits, and truck crops were relatively heavy. Production of oats, potatoes, beans, peas, and apples was above average. Production was below the average in barley, rye, and cotton though these crops were well above the production of 1946. Production of corn, sorghum grain, sweetpotatoes, sugarcane, and broomcorn was smaller than in 1946.

Growing Season Unfavorable

The growing season was chiefly unfavorable. Fall grains, however, had been planted under favorable conditions. Winter wheat acreage was the largest in 10 years. The crop wintered well, abandonment was relatively light, spring moisture was adequate, and harvesting conditions were nearly ideal. It was apparent as early as April that fall-sown crops would prosper. Spring work, however, was delayed by unfavorable weather. Rains and cool, cloudy weather persisted until mid-June in most of the area east of the Rocky Mountains, and prevented fields from drying out. In consequence farmers had to change their intentions significantly in the acreages of various crops. They took advantage of breaks in the weather, and when it was possible worked their machines around the clock. They benefited from improvements in the farm-labor situation and in the supply of machinery and repair parts. Strong demand at home and abroad resulted in prices which were incentives to the farmers' best efforts despite heavily increased costs of production. By July 1 most of the planting was completed—much of it delayed well past optimum dates.

Sunny weather from mid-June through July fostered rapid vegetative growth and favored farm work. But rainfall was scanty, and in extensive areas soil-moisture reserves became exhausted. Crops deteriorated badly in parts of the South Central and West North Central regions. Hot, humid weather with subnormal rainfall prevailed throughout most of the area between the Appalachian and Rocky Mountains during most of August. While these conditions were mostly favorable for harvesting small grains, flax and hay, they were adverse for late-growing crops, particularly corn.

Deterioration of soybeans, sorghums, and other late crops was temporarily checked by rains in late August, but much corn had been irreparably damaged. The late planting of corn posed the problem of "soft corn." Rapid progress in the later stages of development minimized this hazard, though in much of the Corn Belt frosts occurred before the usual dates.

The August 1 estimate of the combined acreage of all crops for harvest was 347.3 million acres, slightly (0.5 percent) more than in 1946. With the exception of 1943 and 1944, this total exceeds that of any other year since 1932. Planted acreages totaled 357.4 million acres. The loss of 10.1 million acres was less than that of any other year since 1930 except 1946. Acreage planted fell short of acreage

planned, largely because light abandonment of winter wheat provided less acreage than usual for replanting to corn and sorghums. In addition adverse weather prevented farmers from planting intended acreage of oats and corn.

Crops for which goals had been set fell below goals by a total of 10.4 million acres, or 3 percent. Plantings of wheat, rice, dry peas, and peanuts exceeded the goals, in each case by a relatively wide margin. But corn, oats, barley, rye for harvest, flaxseed, sorghums, potatoes, sweetpotatoes, soybeans for beans, sugar beets, and dry beans were far below the goals. Tobacco, sugarcane, and all hay for harvest were below the goals in a less degree.

Deciduous fruit production, according to preliminary estimates, was about 6 percent less than the 1946 record. Apple production was about average; peaches and grapes were slightly smaller crops than last year's records; pears were a record. Prospects for the new citrus crop were favorable in all areas except Arizona, where hot dry weather caused much damage. This crop in 1946–47, set a high record. Truck crops for fresh market and for processing were well above average though below the record tonnages of 1946.

Livestock and Livestock Products

Production of livestock and livestock products was about 2 percent less than that of 1946, about 6 percent less than that of 1945 and that of 1944 and 10 percent less than the peak production of 1943. Most of the decline was in meat animals and in wool and mohair. Output of dairy and poultry products was nearly at the 1946 level. Estimated at 42 million pounds liveweight, the production of cattle, hogs, sheep, and poultry was about 1.7 million pounds less than that of 1946, about 9.6 million pounds less than the 1943 record, but greater than in any year prior to 1942.

The number of hens on farms has been steadily declining since the peak year 1944; it seemed likely, however, that production of eggs would be only about 2 percent less than in 1946 and 7 percent less than in 1944. Total milk production was only about 1 percent less than in 1946 and 2 percent less than in 1945. Production per cow, at a record level throughout most of the year, was high enough almost to offset the smaller numbers of cows milked.

WHEAT

The United States has become the largest wheat producer as well as the largest wheat and wheat flour exporter in the world. Before the recent war Russia was the largest producer, with the United States second and China third. In each of the last 4 years, chiefly under the influence of favorable weather, improved seed, and improvement in other cultural practices, our production has reached new high levels. This year's tremendous output does not give us a record available supply, because we entered the marketing year with a very low carryover. Our total supplies of wheat were greater in 1942–43. But we shall be able to export a larger quantity of wheat and flour in 1947–48

than we did in 1946–47, and at the same time to increase our domestic consumption and our carry-over stocks.

Little change is to be expected in the food use of wheat in the United States; but the quantity of wheat fed to livestock may increase, because the corn crop is small. The total production of other grains is materially smaller than last year. Continued large exports of grains will therefore involve proportionately an increased drain on the wheat supply. Should the wheat (and flour) export total exceed that of 1946–47, it will constitute a prodigious contribution to world food recovery; for in 1946–47 the exports of wheat and flour from the United States made up more than half the wheat exports from all countries. This Nation exported 400 million bushels (of wheat and flour) as compared with 229 million bushels exported from Canada, about 70 million bushels from Argentina, 49 million bushels from Australia, and 10 million from all other countries. The total world exports of 757 million bushels may be compared with the prewar average of 560 million bushels.

This world record in the exportation of wheat took place with stocks on hand very low. The four principal wheat-exporting countries, namely the United States, Canada, Argentina, and Australia, had wheat stocks of only 387 million bushels on July 1, 1946. This was the smallest total since 1938; it was much below the prewar (1935–39) average of 458 million bushels. One year later or on July 1, 1947, the carry-over stocks of the four principal wheat-exporting nations were still smaller—379 million bushels. The carry-over position was in startling contrast with that of the war years, when wheat piled up in the wheat-exporting countries. Only 4 years ago the four countries mentioned had combined stocks of 1,740 million bushels, the all-time high. At that time wheat was not the most urgently required world food and simultaneously shipping difficulties interfered with exports.

Wheat Outstanding in Famine Relief

Wheat in 1946–47 was again the outstanding famine-relief food. The world's wheat requirements reflected not only the ordinary per capita requirement, but the demand also for other unobtainable foods. In May 1946 this Department announced that definite foreign needs for about 267 million bushels of wheat, in addition to other grains, were already known. In the fall of 1946 it estimated this country's probable exports of all grains for 1946–47 at 400 million bushels. By early 1947 it said the goal should be to move out the 400 million bushels as soon as possible and before July 1 to be well above that mark. The United States met and surpassed these goals. It shipped out the 400 million bushels of all grains before May 1, and by June 30 carried total food grain shipments above 568 million bushels. This surpassed the most optimistic expectation. About 72 percent of the export tonnage of grain and products was wheat and flour.

Yet consumers in the United States did not go short. As mentioned, the carry-over stocks declined to a low level—83 million bushels on July 1, 1947. But the tremendous 1947 wheat crop made this not dangerous. In fact it was possible in late 1946 to drop restrictions on the domestic use of wheat. A War Food Order effective March 1, 1946,

which required 80-percent extraction of wheat flour as compared with the normal rate of about 72 percent, became inoperative September 1, 1946. Shortly afterward the Department suspended limitations on the quantity of flour and wheat food produced for domestic distribution. Such limitations had been in effect since April 1, 1946.

Significant changes occurred during 1946–47 in the exportation of wheat and flour. The most important were discontinuance of UNRRA and an increase in shipments of wheat, including flour, to the occupation zones. Exports of wheat and flour by UNRRA in the marketing year totaled 56 million bushels or 35 percent less than in the preceding year. On the other hand shipments by the military authorities for civilian relief overseas (including United Kingdom Zone, Germany) totaled about 119 million bushels or an increase of about 42 percent. Exports to "paying countries" were about 222 million bushels—about the same as in 1945–46. When active UNRRA operations supported by donations from member nations ceased May 31, 1947, the task of supplying deficit countries fell increasingly upon the United States.

Prices to Wheat Growers

Wheat prices to United States growers for the 1947 crop have been above those of 1946–47, when they averaged $1.91—the highest since the 1919 average of $2.16. Accordingly, growers expected to seed about as much land to wheat for the 1948 crop as they did for that of 1947. With the foreign demand larger, another large United States crop is desirable. Prices in 1948 with just average yields should again be above the support levels. Above-average yields on the expected large acreage might put some pressure on the price supports. Price support at 90 percent of parity will apply to the 1948 crop until December 31. Thereafter support at that level will give place to other arrangements. Existing law provides for loans beyond 1948 at from 52 to 75 percent of parity.

It is to be expected that the United States will eventually have wheat-surplus problems once more; but it probably will play an active role in the export market for some time, since the world food emergency shows no signs of terminating soon. Moreover, the long-time world demand may rise above the prewar level. Factors of importance in the long-time demand include further increases in the world's population, especially in India and China; the reduced production of wheat in some countries, along with shifts to other crops; and the increased attention given throughout the world wherever possible to the problem of human nutrition.

COTTON

From the standpoint of cotton producers the domestic cotton situation is much more favorable now than for many years. Surplus stocks of cotton in the United States have completely disappeared, and the carry-over August 1, 1947 is only 31 percent of the 1935–39 average. It is about 81 per cent less than the 13-million-bale carry-over of 1939.

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Cotton and cotton products command prices seldom equaled—prices several times those of prewar years.

Cotton-textile mills in the United States are consuming about 40 per cent more cotton than they did in the 1935–39 season. Cotton producers will obtain this year, from an acreage one-fourth less than the 1935–39 average, a crop only about one-tenth below the average for that period. They will receive for it a gross income more than 2½ times that received on the average in the 1935–39 period. Moreover, the gross returns will represent 2⅓ times the purchasing power obtained from the crop in the 1935–39 period, despite the marked increases that have taken place in prices paid by farmers plus interest and taxes.

This favorable position is of course a result largely of the war and its aftermath, and it poses problems, some of which may become pressing within a very few years. Cotton is responding now to certain influences of an obviously temporary character. Export demand, for example, has been strengthened in the last 2 years by the wartime depletion of cotton stocks in many cotton-manufacturing countries. Simultaneously, the United States demand for raw cotton is very high.

Among the causes are the wartime and early postwar reduction of cotton textile inventories, the high level of American buying power, large exports of cotton textiles to meet war-created shortages abroad, and the continuing general scarcity of other goods that otherwise would compete vigorously for the consumer's dollar. Thus durable goods such as housing are difficult to get. Moreover, some factors on the supply side tend to keep production of American cotton from catching up with disappearance. Labor is relatively scarce and expensive in the cotton fields; moreover, other farm enterprises have been giving favorable returns. In consequence the acreage in cotton has been exceptionally small and the domestic disappearance (consumption and exports) has greatly exceeded production during the past two seasons.

Two of the smallest United States crops in 50 years, in combination with some recovery in exports and a continued high domestic consumption, reduced the domestic carry-over by 8.6 million bales in the 2 years ended July 1947. Cotton textile mills in the United States used more cotton in the 1946–47 season than in any other peacetime year; they used 45 percent more than the 1935–39 average. Need for cotton goods throughout the world was almost as urgent as the need for foods, and exports of domestic textiles increased to record levels, thus contributing to the high consumption. Also the Government continued, up to February 13, 1947, to make export payments on raw cotton at the rate of 4 cents a pound, and at lower rates since that date. It took other steps to dispose of American cotton in foreign countries, among them Germany and Japan. Cotton benefited as well from the fact that the production of synthetic fibers in foreign countries was much below the level of the early war years.

Surveys at the end of the war indicated that though four-fifths of the world's cotton spindles were intact, wartime disruption of economies prevented some war-torn countries from obtaining supplies of raw cotton. They especially needed credit and other assistance.

This country furnished help in various ways. For example, through its Export-Import Bank it made special cotton loans to China, Italy, Czechoslovakia, Hungary, and Finland. Good for periods of 15 to 24 months, and bearing interest at 2½ percent, the loans were regarded by the Export-Import Bank as perfectly sound. In some cases the bank granted renewals. Textile manufacturing in foreign countries benefited also from loans made by the United States Government to foreign governments for general rehabilitation purposes. Our loans to Great Britain, France, Belgium, and the Netherlands helped these countries to buy and consume American cotton.

Aid to Ex-Enemies' Textile Industries

This Government assisted the textile industries of Germany and Japan through an emergency-type program. These countries were in serious economic disorder; they had no dollar exchange, no credit, and no way of repaying short-time loans. Germany and Japan before World War II were among the largest importers of our cotton. The emergency program cleaned out the last stocks held by the Commodity Credit Corporation—slightly more than 1 million bales, or about 170 million dollars' worth. Available for sale to needy countries, three-fifths of the textiles produced from this cotton provides payment for the cotton. The remaining two-fifths remains for use in Germany and Japan. Conducted on sound financial principles, the program returns full American prices for all the raw cotton supplied. Cash sales of the resulting textile goods promise to exceed the cost of the cotton by more than $150,000,000 and in that way to reduce the occupation costs. Moreover, the operation helps to reduce occupation costs in another way; it provides employment for German and Japanese workers and takes them off the relief rolls.

Necessarily, the various cotton export programs involved the United States Government in business operations. All told about two-thirds of the American cotton exported during the year ended July 31, 1947, moved out under Government credits of various kinds, including the processing agreements for Japan and Germany. Simultaneously, the governments of other countries were also taking special measures to encourage the exports of their cotton. Estimates indicated that about one-third of the world's international trade in cotton during 1946–47 took place under agreements between governments. Governmental agencies did much of the procurement. If continued, such governmental buying, selling, and shipping of cotton would have important implications for American cotton and particularly for the free-enterprise system. Accordingly, the United States Government is endeavoring by various means to restore private international trading in raw cotton, over numerous obstacles presented by disrupted economic conditions.

Among the efforts in the direction of reviving the private-enterprise method are the new agreements with respect to Germany and Japan. United States Government officials, occupation authorities, German and Japanese officials, and representatives of private industry cooperated in working out a pattern of operations that reduced the Government's role in the emergency transaction. Mill owners are allowed to

buy cotton directly from United States exporters, and to sell their textiles wherever they can find a market. Thus the trade is freer at both ends. Financed in the beginning by the Export-Import Bank, with the United States and British military governments guaranteeing the loans, these programs look toward eventual private capitalization and private management.

Hazards for United States Cotton Growers

While many things have combined to bring about an exceptionally strong current position for American cotton, there are some important hazards which cannot be overlooked. Even from a short-run standpoint our export trade in cotton must reckon with some handicaps. Probably the important cotton-consuming countries will continue for several years to feel the economic exhaustion induced by the war. They will certainly have a dollar shortage for several years, an expression of their reduced ability to produce goods and services for export. The resulting difficulty they will have in financing imports may incline them to depend increasingly on synthetic fibers, the raw material for which usually requires less foreign exchange than does cotton. Moreover, many countries may use much of their available dollar exchange in buying American industrial products, the like of which they can often not get elsewhere. Cotton on the other hand is available to them from many countries, some of which will take European or Asiatic factory goods in exchange.

At present, total supplies of foreign cottons are much more plentiful than American cotton. Carry-over of foreign cotton on August 1, 1947, though below the wartime peak, was 73 percent above the 1935–39 average. Production of foreign cotton is much below that of the prewar years; but the total supply is about 5 percent larger than the 1935–39 average. However, world stocks of foreign cotton probably will decline during the current season. Another year of reduced production in the foreign cotton-growing countries would bring their supply situation more nearly into line with ours.

It is to be expected in the long run that American cotton will again meet with increasing competition from foreign cotton. The food situation in Europe and Asia will improve. This and other postwar developments will release some land and labor from food production elsewhere, and will favor some shift back into cotton. Foreign production of cotton may increase rapidly under favorable conditions. Between 1932 and 1936 it rose from 10½ to 18⅓ million bales. Our foreign market for cotton may suffer also from the expansion of cotton-manufacturing in countries that produced raw cotton but formerly imported sizeable proportions of their cotton textiles. As such countries come nearer to meeting their domestic requirements, total international trade in raw cotton tends to decline, and along with it the world trade in cotton goods. American as well as foreign cottons will feel the effect.

Then, too, American cotton inevitably faces increased competition from the production, in the United States as well as in foreign countries, of synthetic fibers. The world's production of rayon in 1946 was equivalent to nearly 4 million bales of raw cotton; it was 3¾

times as large as in 1930, though the factories of Germany and Japan were largely idle and those of Italy were producing comparatively little. Our own rayon production in 1946 was nearly 6⅔ times as large as that of 1930 and was the equivalent of over 2 million bales of cotton. Production of other synthetic fibers is increasing; between 1940 and 1946 United States production of synthetic fibers other than rayon increased about twelvefold. Paper comes next to rayon as cotton's greatest competitor in the domestic market. Use of paper for bags, towels, handkerchiefs, napkins, window shades, plastics, twine, window drapes, and many other purposes has increased greatly. Still greater competition from paper is anticipated.

How to Meet the Challenge

Cotton can meet this many-sided challenge only through a many-sided program of research, efficiency in production, and wise policy in regard to the domestic and foreign competition. Cotton's power to hold its own in markets at home and abroad depends basically on its competitive strength, and this depends in turn on a sound combination of up-to-date farm practices, correct regional and other crop adjustments, proper care of the soil, and realistic world-trade policy. Cotton research is especially important in the competitive battle with synthetic fibers, paper and foreign cotton. Fortunately, the entire domestic cotton industry along with this Department and the State agricultural agencies has recently united in a strong program of cotton research and cotton marketing. All the participating groups have recognized that vigorous action is necessary along many lines, notably research, farm mechanization, market-development work, and international trade policy. To a challenge without historic parallel the industry is preparing a strong response.

TOBACCO

Tobacco, like cotton, is profitable currently to the growers, but faces problems owing to the shortage of dollar exchange available to foreign importers. One of our chief export crops, and yet not strictly a necessity, United States tobacco depends in large part on the foreign supply of dollars; it reacts especially to efforts by governments of importing countries to conserve dollar exchange.

Thus in 1947 the British Government increased its import duties on tobacco and took other steps to conserve dollar exchange; many other countries endeavored to save dollars for more essential imports. Our exports of tobacco declined sharply from the high level of the previous year. In the first 6 months of 1947 exports of unmanufactured tobacco (declared weight) were only 255 million pounds, as compared with 327 million pounds in the first half of 1946. This was a drop of 22 percent, but 1946 was a year of unusually large exports. During the entire fiscal year 1946–47, however, the exports were moderately above those of the previous year and considerably above the prewar average for 1934–38.

Supplies of burley, a type the greater part of which is used domestically, are large as a result of heavy carry-over from previous large

crops, though 1947 production is close to annual requirements. Flue-cured, although large quantities are used domestically, requires export outlets for more than 40 percent of the crop if recent production levels are to be maintained. Dark-tobacco production though lower than last year is in excess of recent annual requirements. Fire-cured, the second ranking export tobacco, is sharply lower than prewar, but also above current disappearance.

As in former years the United Kingdom was the largest purchaser of American tobacco in 1946–47. For example, it took more than half of our exports of flue-cured leaf, which acounted for four-fifths of the total exports. High leaf prices in tobacco-producing countries and the increased quantities of leaf required for the high cigarette consumption contributed to the heavy drain on dollar exchange. Hence the British Government increased import duties on tobacco leaf by approximately one-half in order to decrease consumption and thereby save principally dollar exchange on the leaf purchases that would otherwise have been made. Rationed goods—food, clothing, etc.—continued in short supply in the United Kingdom, and tobacco users were left with considerable money to buy tobacco products. Therefore, so that an actual decrease in dollar expenditures might be achieved, the Government placed certain foreign-exchange restrictions on tobacco-leaf purchases; and manufacturers in view of the uncertainty of future leaf supplies have instituted a form of voluntary rationing of products to distributors.

The shortage of dollars was acute elsewhere and this too had an adverse influence on exports of American tobacco. The decline by mid-1947 to an export level below that of the previous year would probably have been greater had the United States not provided credits and other aid to many countries. This countervailing influence may keep our tobacco exports temporarily above the prewar rate though below the level of 1946.

Production of tobacco in the United States in 1947 may run a little above 2 billion pounds. It will be smaller than the record crop of 1946, but well above the prewar average. Consumption in the United States continues far above the prewar level. Output of cigarettes in the year ended June 30, 1947, was about 360 billion, as compared with 332 billion in the preceding 12 months and an annual average of 169 billion before the war. Cigarette consumption reached its new high despite an increase in prices; the number of cigarette smokers increased, and also the consumption per person. Cigar consumption was moderately higher than in 1945–46 and higher than in prewar years, though toward the end of the fiscal year it declined. Consumption of chewing and pipe tobacco declined during most of the year and was well below the prewar and war years. Snuff consumption fell below the level of 1945–46 but remained higher than before the war.

Naturally, with a progressively restricted export market the prevailing high level of tobacco production causes some uneasiness. Europe, the traditional market for American-grown tobacco, took in prewar years almost 74 percent of the unmanufactured tobacco exported from the United States. Its ability to continue taking our tobacco will decisively influence our production. Most of the tobacco produced on American farms in 1947 will be subject to marketing

quotas authorized under the Agricultural Adjustment Act of 1938 as amended. Currently, however, the acreage allotments are high, with most growers producing to the authorized limit. With export supplies backing up, it would not be feasible to maintain production at so high a level.

Growers may store their surpluses under Government nonrecourse loans; but if tobacco continues to pile up in excess of domestic requirements, the benefit of that operation can be only temporary. In that event the tobacco growers must have either a larger market, a smaller production, or some combination of the two. The best solution is a larger market. But that means chiefly a larger export market, because our tobacco crops for several years now have greatly exceeded the domestic disappearance, though that is growing.

Dollar Shortage Influential

As indicated, this is largely a question of dollar exchange, which in turn is a question partly of world recovery. Many countries cannot export goods and services at present in anything like the volume necessary to pay for their indispensable imports of foods, raw materials, and other goods. They must either largely dispense with imports or get them on credit. Loans help temporarily, but the ultimate source of dollar exchange must be restored world production and trade. With regard to tobacco, another factor influences the world demand for United States tobacco. Export prices have risen greatly above prewar levels and for the main export tobacco—flue-cured—reached a peak with the 1946 crops. Extremely high prices encourage expanded production elsewhere and tend to limit our market. Our tobacco has had an advantage recently in the fact that the war temporarily restricted foreign production. But in 1946–47, though with some areas still far above normal, the world's tobacco production recovered to about its prewar level. Foreign consumers show an increasing preference for American tobacco, but price as well as quality influences the demand, often predominantly.

Shifts in world production and consumption affect the outlook for American tobacco. Devastation in the war years and unsettled internal conditions since then delay tobacco production in Greece, Germany, the Philippines, and the Netherlands Indies. Cigar wrapper from the Netherlands Indies entered world trade in significant quantities before the war; it has been available from that source since the war in only small amounts. This has increased the importance of American wrapper leaf. Cigarette consumption is increasing all over the world, with favorable effects for American tobacco growers. In some countries cigarettes for some periods were practically a medium of exchange. Growth in the popularity of the cigarette will tend to increase the demand for flue-cured and the light air-cured tobacco, and lessen the demands for dark tobacco.

It may be useful to mention prices received for the 1946 United States crop. For the crop as a whole, the average price was 45.2 cents a pound, an all-time high, as compared with 42.5 cents in 1945. Burley was about the same in price in both years, but flue-cured in 1946 averaged nearly 11 percent higher than in 1945. Fire-cured and dark

air-cured tobacco were lower in price than in 1945. Cigar-filler prices in Pennsylvania were slightly lower than in the previous year, whereas cigar wrapper and binder were higher except in southern Wisconsin. It should be mentioned that for the 1947 marketing season price-support levels are above those for 1946. This is because the parity price has risen.

MILK PRODUCTION NEAR WARTIME PEAK

Milk production on United States farms in 1947 approximated 120 billion pounds, or nearly as much as the wartime peak production of 121.5 billion pounds achieved in 1945. Yet the number of dairy cows on farms was 2 percent smaller than in the preceding year. Average production per cow approximated 5,000 pounds—for the first time in this Nation's history. This high production per cow, the continuation of a trend, resulted mainly from efficient feeding, large use of concentrates, and elimination of low-producing cows. It was helped by improvement in the quality of dairy pastures and roughages, in herd management, and in the genetic quality of dairy herds. Long-time breeding programs involving dairy-herd improvement, the use of proved sires, artificial insemination, and other modern practices gave substantial proof of their efficacy.

Besides meeting an increased domestic consumer demand and providing for all United States military requirements, our milk production provided also for a considerable export movement. Shipments of dairy products to foreign countries were the equivalent of 3.5 billion pounds of milk. They went to occupied and other areas for relief purposes. Production was also sufficient to restore stocks of cheese, evaporated milk, and to some extent butter for domestic distribution. In the United States, civilian consumption of dairy products was about 810 pounds (milk equivalent, butterfat basis). This was nearly 2 percent above the average of the 5 war years 1941–45 and about 1 percent above the prewar (1935–39) average of 801 pounds. Moreover, continued heavy sale of whole milk from farms permitted an increase in the supply of nonfat milk products for both domestic and export needs.

Cash income from farm sales of milk, cream, and butter in 1947 was about the same as the 4,117 million dollars received by dairymen in 1946 from markets plus dairy production payments. The return from marketings in 1946 was 3,716 million dollars and the return from dairy production payments was 401 million dollars. Farm marketings in 1947 were only moderately greater in volume than the 98.6 billion pounds of milk (equivalent) sold the previous year. The total income from dairy production was about the same in the 2 years, despite the elimination of the dairy production payments in mid-1946, because dairy prices were substantially higher during part of 1947 than during the corresponding period of 1946.

Average prices received from sales of milk and cream in the first 4 months of 1947 exceeded returns for the first 4 months of the preceding year including production payments. By mid-May of 1947, prices had dropped below returns (from marketings plus payments) at the corresponding time of 1946, but prices rose in the last half

of 1947. For the year 1947 as a whole, the total returns from prices were little different from the returns from prices plus payments in 1946.

The Government made dairy production payments on sales of milk and butterfat (including farm butter) from October 1, 1943, to June 30, 1946. The purpose was to help dairymen meet increased costs of feed, labor, and other items, and at the same time to stabilize the prices of dairy products at retail. In addition, the payments served to provide seasonal variations in the returns to farmers from milk and butterfat. Under price-ceiling regulations the provision for such variations was not adequate. In regions and during periods affected by drought the Government made additional payments to meet emergency feed costs. The rates of payment reached their peak on a seasonally adjusted basis just before they were ended.

Some indications of declining milk production appeared in the spring of 1946, partly as a result of increases in labor costs and in feed-price ceilings. Accordingly, the Government announced it would increase both the dairy production payment rates and the price ceilings on dairy products, with the increases greater in the ceilings than in the payments in line with the policy of checking further increases in food subsidies. In May and June of 1946 the dairy production payment rates were increased over the corresponding months of 1945 by 20 cents a hundred pounds for milk and by 5 cents a pound for butterfat.

Return to Supply and Demand Prices

Following the simultaneous discontinuance of price controls and dairy production payments, the prices received by dairy farmers became subject once more to demand and supply conditions. Dairy prices increased in the last half of 1946 by more than the production payments that would have been paid if the program had continued. Dairy prices declined in the spring months of 1947 and prices of some dairy products dropped below the ceiling prices that were in effect when the price controls ended, but dairy prices increased generally in the last half of 1947. There was an especially pronounced decline in nonfat dry-milk solids prices in early 1947 and the Government supported these prices from March through August at about one-third below the former ceiling.

The reversion of the dairy industry to demand and supply conditions brought with it some revival of other prewar characteristics such as an increase in butter production and some decrease in the consumption of fluid milk. This change, however, was of small proportions, and the resulting situation suggested that the pattern of civilian utilization of dairy products during the war emergency responded more to incom elevels than to regulations. The consumption of fluid milk, cream, and ice cream likely will remain high as long as consumer incomes remain high, and the consumption of butter will be less than prewar consumption.

Butter production and consumption rates in 1947, though higher than in 1945 and 1946 both in the amount and in the percentage of the milk supply involved, were otherwise the smallest in many years. Per capita consumption of butter was about 70 percent of the 1935–39

average of 16.7 pounds. Production and consumption of cheese on the other hand were at relatively high levels. Production of American cheese approximated the record volume of 917 million pounds produced in 1942 when much of the production was for military and lend-lease use.

Civilian per capita consumption of American cheese was at a record level in 1947 under the influence of high consumer incomes and high meat prices. Production of evaporated milk was greater than in 1946 but less than in 1942, 1944, and 1945. Production of nonfat dry-milk solids, at the record high level of nearly 700 million pounds, reflected the momentum of the war years and was above the quantity the market could absorb at prices remunerative to producers. Price-support purchases served also, however, to meet oversea relief requirements.

LIVESTOCK AND FEEDS

The removal in late 1946 of price controls and of most other wartime regulations led to marked readjustments in the livestock industry; in the meat price structure; and in the marketing, processing, and distribution of livestock and meats. Export and import controls affecting livestock and meats continued in the fiscal year 1947. Domestic consumer demand for meats once more operated under competitive conditions, and distribution of livestock products throughout the country tended to return to normal patterns. Demand was much stronger than had been generally expected; it reflected high incomes and purchasing power of consumers. The disposable income per capita in 1947 was more than double that of 1939, and lower income groups received a larger share of the total income than before the war, with the result that these groups competed keenly for consumer goods.

Meat prices at retail rose to a new all-time high, though the available supply of meat per capita was considerably greater than in prewar years. Prices in 1947 up to August were about 103 percent above the average of 1937–41, and 72 percent above the wartime ceiling prices of 1945–46. Livestock prices reached new record levels. Hog prices made the greatest relative advance, rising to nearly four times the 1939–40 level. Cattle prices rose to more than double those of 1939–41 and unusually large numbers of cattle and calves moved to market. Marketings were large in relation to the number of cattle on farms, and the total slaughter of cattle and calves exceeded that of any other year. Imports of cattle and calves were almost entirely discontinued because of the outbreak of foot-and-mouth disease in Mexico, and the continuation of wartime embargoes on exports by Canada. The heavy slaughter and reduction in imports indicated a continuation of the downward trend in cattle numbers that started in 1945. Prior to that year numbers had increased for 7 years.

The high rate of cattle slaughter provides increased supplies of beef for the current demand but will reduce supplies for the years immediately ahead. It also complicates the problem of maintaining a desirable balance between yearly slaughter and number of cattle raised. This problem will need serious consideration.

A similar problem has already developed in the sheep industry. Rising operating costs and shortages of labor, particularly of compe-

tent herders, caused rapid liquidation of flocks from 1942 to the end of 1946. Sheep numbers in 1947 were the smallest since the keeping of records began in 1867; the lamb crop of 1947 was the smallest since 1925. Supplies of lamb and mutton will be short, not only in 1947 but also for 4 or 5 years hence, because it will take at least that much time to rebuild flocks.

Sharp advances in hog prices and the record 1946 corn crop established a very favorable hog-corn price ratio early in 1947, which encouraged the feeding of hogs to unusually heavy weights, and increased the output of pork and lard. A rise in corn prices, when the seasonal spring decline in hog prices occurred, caused the ratio to become less favorable and this tended to check desired expansion in hog production. Moreover, the uncertain outlook for the 1947 corn crop during the summer tended to speed up hog marketings and caused many farmers to dispose of sows that otherwise would have been kept for fall farrowing. Accordingly, hog production for the 1948 market may not reach the goals.

Meat Production and Exports

Meat production in 1947 is expected to total about 23 billion pounds, or about the same as in 1945 and 1946, and about 20 percent above the average for 1940–41. Beef and veal make a larger proportion of this total than in many years. The proportion of the better grades of beef is relatively small, because many feeders marketed cattle after a relatively short feeding period and at comparatively light weights. The high level of meat production during the 6 years, 1942–47, represents an outstanding production achievement of the war and postwar period. But a part of the increase, especially that of the last 3 years, reflects the slaughtering of more cattle and sheep than were currently produced. In other words it was achieved by reducing the numbers on hand.

With the completion of wartime commitments, meat exports from the United States dropped off after the summer of 1946. Thereafter, these exports largely comprised meats used by UNRRA for relief purposes. Exports of meat in the first 4 months of 1947 were relatively small. They expanded following the time when the United Kingdom increased its purchases which again dropped to zero after June. Yet our total meat exports in the first half of 1947 were equivalent to only 16 percent of the quantity shipped a year earlier. Exports of pork fell below the average of the prewar years, but those of beef were considerably larger. As a result, the supply of meat for domestic consumption was nearly 7 percent larger than in the previous year. Averaged at a yearly rate, the supply was about 155 pounds per capita or 21 pounds more than in the period 1937–41.

After the discontinuance of price controls in late 1946, Government grading of meats was returned to a voluntary basis. During the period of price controls it had been mandatory on all beef, veal, lamb, and mutton sold commercially. Grading is on a fee basis and is entirely self-supporting. Excluding pork, about one-half the supply sold commercially is now being graded on request of buyers and sellers. Compared with prewar days, grading is used more widely

throughout the country and by a much larger proportion of the smaller slaughterers and processors. Many retail stores feature Government-graded meats in their advertising, and housewives generally are more grade conscious than ever before.

Because the corn crop in 1946 was the largest of record while oats and grain sorghum production in that year were above average, feed supplies for the 1946-47 feeding year were relatively large. Feed prices were low early in the year relative to prices of livestock and livestock products, but an unusually strong demand, both for domestic use and for export, caused feed prices to advance sharply in the spring and early summer of 1947. Uncertain prospects for the 1947 corn crop caused feed prices to rise during the summer to record levels.

Farmers generally practiced liberal feeding of dairy cows and poultry, as well as hogs, and the total quantity of feed consumed was well above average. Hog weights averaged the heaviest of record, and the production of milk per cow and of eggs per hen was near record levels. The unusually large numbers of beef cattle fed were marketed with a lesser degree of finish than in previous years. Strong commercial demand for corn and other feeds continued through the year and domestic processing and exports of feed grains were the largest in recent years.

The unusually strong demand for and increased use of feed in recent years has prevented any accumulation of large stocks since the war, despite the extremely high level of production.

FRUITS AND VEGETABLES

Fruit and vegetable production in 1947 totaled near that of 1946 and other recent years. Prices generally were not quite as high as in 1946, but cash income to farmers continued at a high level.

The 1947 deciduous-fruit crop, despite a late spring east of the Rocky Mountains, was nearly as large as the record 1946 crop. The peach, pear, and grape crops were of record or near-record size, but the commercial apple crop was about average mainly because of late spring frosts in the Appalachian area. Total production of tree nuts was slightly larger than in 1946 and near the record crops of 1944 and 1945.

The 1946–47 citrus crop, most of which was marketed in 1947, was the fifth consecutive crop to establish a new high record. These increases in production have resulted from the initial bearing of recent heavy plantings, the enlarged bearing surface of older trees, and generally good care given to the orchards.

Production of vegetables for fresh market use and for processing was slightly smaller in 1947 than in 1946 but still well above average. Potato production was sharply reduced from the record 1946 crop yet was near average. The 1947 crop of sweetpotatoes was slightly smaller than the 1946 crop, but the dry edible bean and pea crops were about as large.

Mainly because of increased stocks at the beginning of the packing season and a somewhat reduced demand, the 1947 packs of canned and frozen fruits and vegetables were slightly smaller than the record-

large 1946 packs. On the other hand, the 1947 pack of dried fruits was considerably larger, because of greatly increased production of raisins.

Long-Time Trends in Fruit

Between the two world wars the aggregate production of deciduous fruits increased on the average by about 25 percent, compared with a 30-percent increase in population.

During recent years the apple crop has been 20 percent smaller than during 1914–23, whereas over the same period production increased 50 percent for peaches, 80 percent for grapes, and an average of 100 percent for the other deciduous fruits.

Use of deciduous fruits in fresh form declined somewhat during this period, while their use for processing doubled. Expansion of canning and freezing was particularly rapid.

Between the two world wars, approximately the equivalent of 1.3 million fresh tons annually, or about one-sixth of the deciduous-fruit crop, was exported. This was double the volume of 25 years ago and of the recent war years. Readjustment of the marketing pattern to offset reduced export outlets represents one of the most important current problems facing producers of deciduous fruits.

The production of citrus fruits has virtually doubled every 10 years for the past four decades and production is destined to continue upward.

Of the world crop, the United States produces over 95 percent of all grapefruit, about 50 percent of all the oranges and lemons. Principal producing States are Arizona, California, Florida, Louisiana, and Texas. Small quantities are grown in Alabama, Mississippi, on the sea islands off the coast of Georgia, and in Puerto Rico. California and Florida produce more than 90 percent of the oranges, and Florida and Texas account for more than 85 percent of the grapefruit. California produces almost all the commercial crop of lemons.

In the 1945–46 season 37 percent of the total crop was processed as compared with only 9 percent in 1935–36.

Production has expanded more rapidly than has our system of marketing and distribution. The rapid development of processing has provided new problems for the industry.

The United States converts annually under normal conditions about 2,250,000 tons of fresh apricots, dates, figs, grapes, peaches, pears, and prunes into about 600,000 tons of processed dried fruits. More than 95 percent of this production is concentrated in California, and nearly 500,000 tons of the California production consists of dried prunes and raisins.

Before the war about 37 percent of the total dried-fruit supply produced in this country, excluding dates and figs, was exported. During the war, huge quantities were acquired by the military services, Government agencies, and for lend-lease purposes.

The major problem now confronting the dried-fruit industry is loss of export markets, since production in this country far exceeds domestic requirements. For the 1947–48 marketing season, the Government is softening this blow to the industry by purchasing dried fruits for use in domestic school lunches and in foreign relief feeding.

Both the immediate and long-time needs of the industry include action to develop wider domestic and foreign outlets and high standards of quality for the fruit.

Vegetable Production

Vegetable production in 1947 was considerably above the past 10-year average. Vegetable production for fresh market consumption may be about 15 percent more than the average produced during the period 1936–45. Production for fresh market consumption in 1946 was about 45 percent more than the average produced during the prewar period 1935–39. The 1946 production of truck crops for processing was 80 percent more than the average production during the 1935–39 period.

The heavy 1946 production was due in part to the removal of restrictions from the canning industry, and to the need for the restoration of inventories to levels sufficient to maintain supplies at the high rate of demand under current income levels. The canning industry produced about 70 percent more canned vegetables in the 1946–47 season than the average annual rate of production during the 1935–39 period. The lowered production of vegetables for fresh market and for processing was primarily due to less favorable weather conditions.

Production of frozen vegetables expanded from a prewar average of about 85 million pounds for the 1937–41 period to 450 million pounds in 1946. Nearly 60 percent of the 1946 production of frozen vegetables was packed in consumer-size, packages of 1 pound or less net weight.

Production of dehydrated vegetables expanded from a prewar level of less than 5 million pounds to approximately 200 million pounds in 1944–45. In 1945–46 production declined to approximately 100 million pounds. By 1947 the dehydration of vegetables had declined to about the prewar production level. Plant facilities expanded to meet war needs are not now necessary.

POTATOES

In discussing potatoes last year in this annual report I told what had happened up to about mid-September of 1946. Our crop of potatoes in 1946, as in 1945, exceeded what the United States required for food, seed, starch, and other domestic purposes, and presented a big surplus for disposal in other than the usual market channels. Prices to growers threatened to fall below the mandatory support-level at 90 per cent of parity. Accordingly, the department purchased large quantities of early potatoes. Not suitable for lengthy storing, most of these potatoes had to be diverted into stock feed, into the manufacture of starch and alcohol, into relief at home and abroad, or into other surplus-disposal channels. In reporting these purchases, which by mid-September 1946 had run above 30 million bushels, I said further government purchase and diversion of 1946 potatoes probably would be necessary. Subsequently, the department's potato-buying increased tremendously.

The department anticipated most of these developments. On November 26, 1946, I wrote to the chairmen and ranking minority members of the Senate Committee on Agriculture and Forestry and the House Committee on Agriculture suggesting a joint conference to consider the whole question of price-support policy. I pointed out that under certain conditions and for certain commodities price-supports may prevent the development of production-patterns in line with peacetime needs. I mentioned some of the administrative problems often connected with the price-supports. My letter specially emphasized the cost of maintaining price supports for potatoes; it gave a forecast of the quantity of 1946-crop potatoes that seemed likely to be lost for lack of outlets. I referred also to plans then in contemplation for avoiding a repetition of the difficulties experienced in 1946, and urged an early and thorough re-examination of the whole question with a view to the discovery and adoption of ways to reduce the costs and wastes involved in connection with price supports not only for potatoes but for other commodities sometimes produced above market needs.

The average yield per acre of potatoes in the United States in 1946 as finally determined was a new high record of 184.5 bushels. As recently as 10 or even 5 years ago such a figure would have been considered fantastic. It resulted partly from unusually favorable growing conditions and partly from recent acreage shifts from low to high-yielding areas, plus other technological advantages. Total production in 1946 was likewise a record high—at 476 million bushels. This production, almost 100 million bushels in excess of requirements, made my forecast of continued heavy support operations an understatement. In order to carry out the obligations created by the Steagall amendment the Department had to use all the disposal devices employed in previous potato programs plus some new methods. Basic methods were purchases for the early and the intermediate crops and loans for the late crops, with borrowers allowed to deliver potatoes in lieu of cash repayment. So as to provide an efficient mechanism for receiving and disposing of potatoes, the Department continued the purchase program through winter and spring months. It also conducted diversion operations through an arrangement that involved indemnity payments to participating manufacturers, with the general purpose of getting maximum consumption of potatoes in the manufacture of flour, starch, glucose, and alcohol. These activities, though unprecedented in magnitude, were such as had been used in previous years.

New approaches to the problem with one exception were within the normal framework of the purchase program. Offerings to the Department at various times and places exceeded the available outlets; yet in fulfilment of its obligations the Department had to accept them. Needless to say, this situation presented some unusual difficulties. It became necessary for the department to purchase and take title to potatoes that had to be left in emergency storage on farms. Growers accepted the responsibility of delivering the potatoes if and when called upon to do so, or otherwise of disposing of the potatoes at their own expense. This procedure inevitably involved substantial losses. The department felt, however, that it had no alternative. It held

that by taking title to the surplus potatoes and holding them where they would be available if uses developed, it was discharging its responsibility to growers and to the Nation.

Another and strictly emergency measure involved making advance payments to growers for potatoes prior to harvest in a restricted area of North Carolina and Virginia. The department took this action late in the early-crop season; though sometimes proposed, it had never been attempted before. Actually, the circumstances were very unusual. The department had urged growers in the area to delay their harvesting so as to keep their offerings more in line with outlets. Then a long period of heavy rains began, during which harvesting was impossible. Meantime, weed-growth became so rank that harvesting after the rains ended would have been very expensive. Moreover, by that time migratory labor had moved north, and the supply of local labor was not sufficient. Successful as a fulfilment of the Government's obligation to the growers, the experiment involved administrative activity of a kind generally not desirable, and consequently not likely to be relied on in the future. Another program relatively new with respect to potatoes though often used for other commodities was an export payment plan; it involved the payment of indemnities to persons who exported potatoes under certain conditions. For example, processors who purchased eligible potatoes at support prices and exported the processed product received indemnities.

By these means the department acquired or otherwise handled more than 98 million bushels of potatoes. It was able to dispose in useful outlets of all but about 26.5 million bushels. Briefly, the disposition was as follows: (1) 3.2 million bushels in distribution to school lunch programs, charitable and welfare institutions, etc.; (2) 11.3 million bushels in exports; (3) 9.5 million bushels in the manufacture of starch, flour, and glucose; (4) 18.3 million bushels in diversion to stock feed; and (5) 29.2 million bushels in the distillation of alcohol. As mentioned, useful disposition was not obtained for 26.5 million bushels. Much of this loss, however, consisted of early potatoes harvested under hot weather conditions, which made storage for any length of time impossible. Moreover, the losses consisted largely of low grades and small sizes, such as generally are not in commercial demand, and of deteriorating lots in a condition too poor for economical salvage.

In midsummer of 1946 the department made an effort to interest world relief agencies, the Army, and foreign governments in our surplus potatoes. The only immediate response came from Belgium, which ordered one million bushels for late fall delivery. Lack of interest in the matter prevailed throughout most of the fall and winter, though for foreign relief feeding this country offered prices as low as 4 cents per hundred pounds f. o. b. at the point of government purchase or storage. Late in the winter, however, the situation changed. Foreign governments, UNRRA, and the United States Army developed a great interest in surplus potatoes; they placed orders so large that it was evident packing and shipping facilities would be insufficient to do the job in the short time allotted. Nevertheless, a considerable movement began immediately and in a period of about 12 weeks drew 10.3 million bushels into export channels. This was a

very creditable achievement, because it took place when the domestic movement of seed and table stock was at its height.

In connection with the 1947 crop the department endeavored to head off the production of another big surplus. It announced an acreage goal considered likely at a reasonable yield to be sufficient for our needs, and said price-support would be denied to any grower who exceeded his acreage allotment. Acreage planted to potatoes in 1947 was considerably less than in 1946 and less than the 1947 goal, and the first production estimate (as of July 1) indicated a crop of only 352 million bushels or 124 million bushels less than the crop of 1946 and 24 million bushels less than the 10-year (1936–45) average. Growing conditions in July were good to excellent and the production-prospect improved; nevertheless, the output is not likely to give us such a nationwide surplus as we had last year. In all probability we shall have only local and temporary potato surpluses this year, such as have occurred already in a few areas.

The price-support program for 1947 offers potato growers an incentive to avoid excessively heavy sales at harvest time and to spread their supplies rather evenly throughout the season. In connection with the early and intermediate crops it was not fully possible to find useful outlets for surpluses. Out of approximately 3.5 million bushels purchased by the department up to the end of July, about half a million bushels were lost. This loss occurred prior to July 1 and consisted largely of low grades and small sizes for which there was practically no demand.

It may be of interest to see what became of the surplus potatoes purchased by the department up to the end of July. As mentioned half a million bushels were lost for want of suitable uses. Distribution to school lunch programs and to charitable and welfare institutions absorbed 677,000 bushels; diversion to livestock feed accounted for 91,000 bushels; dehydration for export took 230,000 bushels; the manufacture of starch took 649,000 bushels; the manufacture of alcohol took 8,400 bushels; and exports absorbed 303,000. In addition, 959,000 bushels were placed in cold storage for subsequent disposal.

POULTRY INDUSTRY IN READJUSTMENT

The poultry industry made progress in readjustment to peacetime conditions. In the fiscal year 1947 supplies of poultry products were adequate, except in the short period during which price ceilings were restored under the amended Price Control Act at June 30, 1946, levels. This legislation exempted certain items, among them poultry and eggs and poultry and egg products. Since other livestock products, especially meats, were then scarce, the prices of hens, chickens, turkeys, and eggs rose sharply. On October 15, 1946, administrative orders removed price ceilings from all livestock and livestock products, of surpluses; poultrymen experienced this aspect of "normality" in and thereafter the prices of chickens and turkeys declined considerably; egg prices declined though not to the same extent. By early 1947 prices of turkeys and also of eggs had declined to a level that required price-support programs. Under peacetime conditions the

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poultry industry like other branches of agriculture often has problems 1947.

It was evident early in the year that egg supplies would exceed domestic requirements. Accordingly, the Department of Agriculture in January through March bought dried eggs increasingly for price-support purposes. As an additional means of giving effect to the legislative requirement for price support, it began in March to buy frozen whole eggs. Purchases of dried eggs and of frozen whole eggs continued for the rest of the fiscal year. Purchases of dried eggs during fiscal 1947 totaled 99.3 million pounds and of frozen eggs 55 million pounds. About 33 million pounds of the dried eggs purchased were sold to Great Britain. Egg prices in the spring of 1947 were high—in fact they were at record levels for that season of the year. Price-support action was necessary, however, because the parity level for eggs was likewise high. Under the Steagall amendment, the Government must maintain support prices for Steagall commodities until December 31, 1948, at not less than 90 percent of the parity price or the "comparable" price. This legislation, plus the prevailing price conditions, made the price-support action mandatory.

Producers of turkeys faced a problem that observers had anticipated—the problem of an overproduction of large turkeys. In the war years the production of heavy turkeys far exceeded the ordinary demand, which comes principally from hotels, restaurants, and other large users. In early 1947, with military requirements reduced, turkey prices were below the support level in certain areas of the Western States. Accordingly, the Department in February started a price-support program, under which during the next few weeks it purchased turkeys to a total weight of 3.6 million pounds. Broadly, the turkey program served its purpose by creating confidence rather than by purchasing. After permitted cancellations, the net purchases by the Department amounted to only 1.6 million pounds. Announcement of the support level, coupled with moderate purchasing, reassured persons who owned record-high storage stocks and headed off a possible slump.

Problems of Transition

Many other problems marked the early phases of the transition from wartime to peacetime conditions. Poultrymen had difficulty in buying feed; many of them, especially in the east-coast and west-coast areas, had to liquidate their flocks substantially in the second half of 1946 and to restrict the raising of pullets. This produced local shortages of eggs in the areas affected. In the Midwest the feed shortage had much less effect on the production of poultry and eggs. Throughout 1946 the Government bought eggs for export both in the dried and the frozen form, principally for the British Purchasing Commission; otherwise, the national average of egg prices would probably have declined below the mandatory support level. By early 1947, however, liquidation of flocks and restriction of pullet raising had given place to reexpansion. On June 1, 1947, farmers had nearly as many young chickens on farms as a year earlier. Egg prices had increased sufficiently to offset rising feed prices.

This development was a change from the year's early indications; the hatching season began slowly, and farmers reported an intention as of February 1 to raise 6 percent fewer chicks and 25 percent fewer turkeys than in 1946. Nevertheless, profits from egg production during the hatching season were at an all-time high. Undoubtedly this caused the producers to aim higher. Broiler producers had a large number of chicks ready for market in January and February, by which time meat prices had declined substantially; meantime, cold-storage holdings of turkeys and chickens were increasing. Hence broiler prices were relatively low in early 1947. But broiler prices picked up. Toward the end of the fiscal year broiler producers were looking forward to another record production. Early indications that 1947 might see general overproduction and declining prices for the poultry industry gave place to signs that basic-demand conditions were still strong.

The Support-Price Levels

Nevertheless, poultrymen were not without concern for the future. Some questions arose as to the mandatory price-support levels. Organizations of both producers and processors expressed opposition to the Steagall amendment, on the ground that it might encourage the production of more eggs and poultry than the market would require. For example, the Associated Poultry and Egg Industries, composed of nine organizations, declared in 1946 that application of the Steagall amendment to the poultry and egg industry would delay and complicate its readjustment problems. In a letter it urged the Secretary of Agriculture to do everything possible to get poultry and poultry products removed from the provisions of the Steagall amendment. Other groups of poultrymen, however, said they wanted the price supports continued.

The Department sought the opinions of producers throughout the country. It inquired as to their preferences for types of program. In February, March, and April it sponsored meetings in each of the States and invited representatives of all phases of the poultry industry to attend. Among various opinions, the concensus was that price support through governmental purchase operations should continue at least until the Steagall amendment expires on December 31, 1948.

WORLD SHORTAGE OF FATS AND OILS CONTINUES

Greater than it was last year, the world's supply of fats and oils is not yet up to consumption needs. Imports of vegetable oils into deficit countries tend to be restricted, because of the high prices demanded, as well as export controls maintained by surplus areas. Before the war Europe absorbed a large proportion of the world's exportable supplies of fats and oils, and Europe's buying power is now very low. Consumption of fats and oils in Europe will probably be low by prewar standards for some years.

Fats and oils available for the world's consumption in 1947 were largely obtained from vegetable oilseeds harvested in 1946 and from palm oils, animal fats, and marine oils produced currently. Further recovery took place in the copra production of the Philippines; and

the Antarctic whaling season resulted in approximately the catch permitted by international agreement. An increased supply of olive oil resulted from a good harvest in the Mediterranean area in 1946. Altogether the supply of fats and oils available for consumption in 1947 was fully 5 percent greater than in the previous year. Output of animal fats exceeded that of 1946 and was at least equal to that of 1945; the improvement in this part of the fats and oils supply reflected greater production in North America along with some increase in butter and lard production in Europe.

The quantity available for international trade increased substantially though it remained far below the prewar level. It was estimated at 3,500,000 short tons oil content as compared with 2,900,000 tons in 1946 and an average of 6,500,000 for the period 1935–39. Copra and whale oil accounted for practically the entire increase. Not all the increase in the world's production of fats and oils became available for world trade. Political unrest hampered exports of fats and oils from some countries, notably the Netherlands Indies and Manchuria. In many countries, notably India and Brazil, greater domestic utilization took place based on an improved buying power. Nevertheless copra and coconut oil from the Philippines along with shipments of edible fats and oils from North America alleviated the world shortage materially, though the consumption in most European countries was not above 80 percent of the prewar average and in some not above 60 percent.

United States Position Favorable

As in most branches of agriculture the position of the United States was relatively favorable in fats and oils. Consumption per capita improved over that of 1946. Action by this Department overcame a shortage of drying oils. Our production in 1946 was insufficient for domestic needs, and imports of flaxseed for crushing were unobtainable, while linseed oil was available only at a high price and in a very limited quantity. The Department assured United States growers a price of $6 a bushel for flaxseed grown in 1947. The response indicated an adequate supply for the coming year and made our industry independent of foreign supplies. Production of peanuts and likewise of soybeans continued in excess of domestic requirements. Exports of peanuts and soybeans, either as oil or as seed, account for only a small proportion of the output. An output above the domestic need is desirable, however, both to guarantee an adequate domestic supply and to alleviate world needs.

This country is the largest supplier of lard to foreign markets. It will release more lard for export in 1947 than seemed possible when the year began. The demand from European countries has been heavy, and the increased world availability of copra enables us to spare more lard. Exports of lard in 1947 will be about the same as 1946, which was considerably greater than the average for the period 1937–41.

Prices of fats and oils in the United States declined during the second quarter of 1947. Similarly, the price of copra in the Philippines fell from $250 per long ton to around $140. Few countries were in a position to absorb, at the prices asked during the first months of

1947, as large a quantity of fats and oils as they did before the war. As mentioned, supplies were still limited in 1947 and the International Emergency Food Council continued to direct the international distribution. But supplies available in world trade will eventually approach the quantities taken before the war. Prices then will likely weaken, and the possession of foreign exchange by consuming countries will chiefly control the international distribution.

SUGAR PROBLEM AND LEGISLATION

The year witnessed a transition from depleted sugar supplies to an approximate balance between world production and world sugar consumption as controlled by rationing restrictions in most countries. A higher level of world production was attained this year, the result primarily of an astounding increase in Cuba's output under purchase agreements with the United States. Cuba produced 6,445,207 short tons, as compared with its production of 4,476,000 tons in 1946, and its prewar (1935–39) average of 3,183,000 tons.

World supplies of sugar have not yet reached prewar per capita consumption levels and may not do so for some time to come. Higher sugar prices, along with reduced purchasing power in many countries, however, foreshadow a curtailment of world demand for export sugars and possible future pressure of supplies on the world market as in prewar years. This prospect resulted in enactment by the United States of the Sugar Act of 1948, approved August 8, 1947, and in consideration by the Food and Agriculture Organization of the reinstitution of the international sugar agreement.

World production of sugar in the 1946–47 crop year was estimated at 31,235,000 short tons raw value, as compared with 26,300,000 tons in 1945–46 and an average of 34,783,000 short tons for the 1935–39 period. Java, Formosa, and the Philippine Islands, which are normally important exporting countries, produced only minor quantities. With the world supply available for 1947, consumption considerably below prewar levels, although much larger than that of 1946, it was necessary to continue the international allocation of world supplies among consuming countries and to maintain price control in the United States.

Under the international allocation for the calendar year 1947 it was possible to increase the amount of sugar available to the United States to a quantity in excess of our prewar total consumption (7,100,000 tons as against 6,800,000 tons consumed in prewar years) and also to increase supplies for other countries. Because the Cuban crop outturn greatly exceeded early expectations and outturns in other American sources increased, while other sources of supply for the United Kingdom and Canada fell below early expectations, a record quantity of Cuban sugar was made available for Europe.[1] The increased world

[1] The 1947 allocation of the total exportable Cuban sugar of 5,668,000 tons was as follows:

	Tons
United States	3,696,000
United Kingdom	1,220,000
Canada	204,000
Metropolitan France, French North Africa, and French Colonies	142,000
Finland, Greece, Norway, Switzerland, and Netherlands	290,000
Elsewhere	116,000

production made it possible in the United States to remove household rationing on June 12, 1947, and industrial rationing on July 28, 1947.

The Sugar Control Extension Act of 1947 required the elimination of price control as well as of all forms of rationing by October 31, 1947, with the exception of certain inventory controls which the Secretary was authorized if necessary to continue until March 31, 1948. In line with its policy of restoring prewar marketing practices as soon as the public welfare allowed, the Department in June approved the resumption of trading in futures on the New York Coffee and Sugar Exchange beginning with the May 1948 delivery. Prices on the Exchange in the first few weeks of trading were somewhat below the ceiling level of 1947. Transition from control to decontrol seemed to have been accomplished without calamitous fluctuations like those that followed World War I. This was largely attributable to the record 1946–47 Cuban crop and the expected near record United States beet crop of 1947.

Sugar Problems and Policy

Sugar prices were satisfactory from the standpoint of producers. Nevertheless some producers in the United States and in Cuba were uneasy over the future, in view especially of low world consumer purchasing power. The eventual return of Java, Formosa, and the Philippines to full production held possibilities of a world surplus. This apprehension induced consideration of the advisability as a precautionary measure of reenacting United States legislation for quotas and Government payments to domestic producers. It was evident that the consequences to Cuba, Puerto Rico, Hawaii, and the continental sugar producing areas of another price debacle could be calamitous.

Accordingly the Congress enacted legislation to serve as insurance against serious price deflation in the next few years. On August 8, 1947, the President approved a bill which with certain modifications continued the provisions of the Sugar Act of 1937 for a 5-year period. Like its predecessors (the Jones-Costigan Sugar Act of 1934 and the Sugar Act of 1937) the measure aimed primarily to stabilize the sugar producing, refining, and importing industries. It provided for a quota system, with necessary complements, to divide the United States market among domestic and foreign supply areas. The complementary features are a tax on sugar and conditional payments to producers of sugar beets and sugarcane. Other important features protect consumers against excessive prices, protect growers on prices paid by processors, and protect labor against low wages.

Furthermore (Section 201) the act changed the method of estimating each year the quantity of sugar needed to meet the requirements of consumers in the continental United States. The Sugar Act of 1937 provided that the estimate should afford a minimum annual per capita supply not less than that of the 2-year period 1937–38. This per capita standard disappeared from the new act. Instead, the legislation provided that the Secretary, in making his determination of consumer requirements, shall consider certain standards with a view to providing a supply of sugar which will be consumed at prices not excessive to consumers and yet consistent with the welfare of the domestic sugar industry. Among these standards is the relationship be-

tween the prices at wholesale for refined sugar and the general cost of living prior to the termination in 1947 of sugar price control.

Another section (202) changed the sugar quotas from those previously established. Under the Sugar Act of 1937, the quotas for all sugar-producing areas, both domestic and foreign, were based on a percentage of the estimate of United States consumption requirements. Annual quotas varied with the estimate. The new measure established quotas for domestic areas in specific amounts. Then, after apportioning a quota of 952,000 short tons to the Philippines, it distributed the remainder of the consumption estimate to Cuba and foreign countries (other than Cuba and the Philippines) on approximately the same percentage ratios as those provided in the Sugar Act of 1937. The quota for the Philippines conformed to the quota under the Philippine Trade Act of 1946.

WOOL

On January 1, 1942, some 49.3 million stock sheep were on farms and ranches in this country, a near record high. By January 1, 1947, the number had dropped to 32.5 million, the lowest in records since 1867. This decline resulted largely from unfavorable conditions during the war, and from an uncertain postwar outlook associated with the accumulation of large stocks of wool in this country and abroad. It reduced domestic wool production to the lowest level since 1925. Production in 1947, about 315 million pounds, was one-fourth smaller than 1935–39 average production.

The position of the domestic sheep and wool industry improved somewhat during 1947. Domestic flocks came through the winter in good condition and ranges were above average during most of the year. Lamb prices remained at record levels throughout 1947; under legislation enacted in mid-1947, farm wool prices during the second half of 1947 were supported at a general level as high as that of 1946 and price support at this level will continue through 1948. The slaughter of sheep and lambs declined sharply. Wool production in 1948 may consequently be only slightly smaller than in 1947.

Despite the still formidable problem of liquidating world stocks, prices of fine-grade wools of the types usually imported into the United States increased substantially in foreign markets during the early months of 1947. As a result, the duty-paid prices of many qualities of fine imported wools rose slightly above the support prices of similar domestic wools. Consequently, growers were able to obtain higher prices for such wools through direct sales to mills and dealers than they could obtain through the support-price program. The long-term outlook for domestic wool growers, however, remained uncertain. Wool prices in August, when the new support program became effective, were considerably below their prewar relationship to the general level of farm-product prices and seemed likely to remain so because of large world stocks and increasing competition from synthetic fibers, the production of which since prewar years has been greatly expanded and improved.

The strategic importance of a domestic wool-growing industry in wartime and the importance to agriculture of this industry in large

sections of our country that are not generally suited to other agricultural enterprises make it desirable to replace the present temporary aid to growers with a long-time program integrated into the general program for agriculture and coordinated with our foreign-trade policy. Under the Research and Marketing Act of 1946 research in wool production and marketing by this Department and by cooperating agencies should help to provide a basis for such a program.

Questions of Wool Policy

Some important questions of wool policy arose in 1947. The Congress enacted Public Law 360, which provided price support to domestic growers through the remainder of 1947 and through 1948 at the level maintained in 1946, and permits the Commodity Credit Corporation to dispose of its accumulated wool stocks at less than parity.

Currently the United States is producing only about one-third of its consumption of wool, and importing the remainder. Hence the domestic market has a close interrelation with conditions abroad, and strongly feels developments in foreign countries.

The Governments of the United Kingdom, Australia, New Zealand, and the Union of South Africa are cooperating to market government-owned stocks accumulated during the war, and meantime to stabilize prices of new clips in the British southern Dominions. Representatives of the United States Government have met with representatives of other wool-producing and -consuming countries to consider further means of international cooperation. Wool developments since the war ended have been more favorable than had been expected, yet the absorption of surplus stocks into consumption is a formidable problem.

FARM INCOME IN 1947

Farm income in 1947 will be the highest on record. It is likely that cash receipts from farm marketings will be about 29.7 billion dollars, 21 percent above 1946, the previous record year. Government payments, however, will total only about 350 million dollars, less than half of 1946, and total cash receipts including Government payments may reach 30 billion dollars, 18 percent over 1946. The difference between the Government payments in 1947 and 1946 is due largely to the discontinuance of production-payment programs for dairy products, beef cattle, and sheep on June 30 last year. In general, the gain in receipts from farm marketings in 1947 is due to a substantial increase in prices with most of the gain occurring in the first half of the year compared with 1946. Cash receipts from livestock and products are up about 23 percent, crops about 19 percent.

Cash receipts in 1947 probably will be higher than last year for all of the important commodity groups except fruit and nuts. Wheat, corn, cotton, hogs, and cattle are showing significant gains. It is expected that wheat will make the greatest percentage increase of any of the major commodities. Relatively high prices are being paid for the record wheat crop and total receipts from wheat this year may be as much as 75 percent above last year. Higher prices of corn

plus larger sales last spring from the large 1946 crop are more than enough to offset smaller marketings in the latter part of 1947; and total receipts for the year may be about one-third above 1946. Receipts from meat animals will increase sharply largely because of higher prices. Cash receipts from hogs and cattle may be up 40 and 35 percent, respectively.

Production expenses in 1947 are likely to be about 16 percent above 1946, when they amounted to slightly over 14 billion dollars. This is the largest percentage gain over the previous year since 1942. Increasing prices for nearly all commodities and services used in farm production are the principal reason for higher total costs.

All the major expense items are up this year. The largest increase, more than one-third, is in the cost of operating motor vehicles. The number of automobiles, motortrucks, and tractors on farms has increased; and so has the cost of fuel and repairs. The cost of purchased livestock is up about one-fourth. And the average cost of miscellaneous operating expenses has increased almost as much.

Increases of around 15 or 20 percent are expected in rents paid to nonfarm landlords, in maintenance and depreciation charges on capital equipment, and in the cost of fertilizer and lime. Rent to nonfarm landlords is rising with higher net returns from farming. Maintenance and depreciation charges have risen with increased expenditures and higher valuations on farm buildings and machinery. And higher prices are being paid for larger quantities of fertilizer.

Increases of some 10 percent are likely in taxes, feed, and hired labor. Property taxes are up, with rising costs of public services. The number of livestock fed may average 4 or 5 percent less than in 1946; but feed prices are 15 percent higher. And both wage rates and employment of hired labor are up this year. Farm-mortgage interest payments are also rising for the first time in 25 years, since new debts are being incurred faster than old mortgage debts are being paid off.

Gross farm income—the sum of cash receipts from farm marketings, Government payments, the value of farm products consumed in farm households, and the rental value of farm dwellings—is estimated at 34.3 billion dollars in 1947, or 18 percent above last year. This is a larger relative increase than the increase in production expenses; and net income therefore is expected to show an increase of about 20 percent. The realized net income of farm operators, or the difference between gross income and production expenses, is estimated at 18 billion dollars for 1947.

Influence of Price Supports

Agricultural price supports have influenced the 1947 level of prices only to a slight extent. Purchases for price-support purposes during the first half of the year were limited to potatoes, eggs, dry milk solids, and turkeys. The market prices of some agricultural commodities, owing to the strength of the demand at home and abroad, were from 30 to 50 percent above announced price-support levels. Market prices for agricultural products in the January–June period averaged 120 percent of parity. Legislation prescribed support-price action in most cases at 90 percent of parity—92½ percent for cotton.

On the much higher average level that actually prevailed, factors other than the price supports were the mainstay, notably full employment at home and an urgent commercial and relief demand abroad.

As President Truman's Midyear Economic Report indicated (p. 39), the agricultural price-support system has exercised a moderating influence on price inflation, through the assurance it gives to farmers that they may safely keep their production high. With price protection guaranteed at 90 percent of parity or higher for a wide range of commodities at least until the end of 1948, after which time the Steagall provisions will lapse and loan rates on basic commodities will presumably revert to the lower levels prescribed in the Agricultural Adjustment Act of 1938, as amended, the farmers maintain their output at near the wartime peak. This is the best possible safeguard against inflation.

It should be noted that legislation makes price-support action mandatory. The Department of Agriculture has little discretion in the matter. Price-support laws recognize three classes of commodities. First is the so-called basic group—cotton, corn, wheat, tobacco, peanuts for nuts, and rice. Loans for all basic commodities except cotton must be at 90 percent of parity, for cotton at 92½ percent. This requirement, prescribed in the Stabilization Act of 1942, holds for the crops of 1947 and 1948.

Next is the so-called Steagall group—commodities requested in increased amounts during the war years. Mandatory at 90 percent of parity until December 31, 1948, price supports for this group cover hogs, eggs, chickens with certain exceptions, turkeys, milk, butterfat, certain varieties of dry peas, certain varieties of dry edible beans, soybeans for oil, peanuts for nuts, flaxseed for oil, potatoes, sweetpotatoes, and American-Egyptian cotton. Certain other price supports are not mandatory and involve no set rates. But within the limit of the funds available and the ability of producers to match supply with demand, the Department must try to maintain a "fair parity relationship" between the mandatory and the permissive price support fields.

This Government has purchased agricultural commodities for other than price-support purposes, notably for the relief of the world food emergency. Its buying for export has undoubtedly strengthened agricultural prices. Our food exports in the year ended June 30, 1947, exceeded 18½ million long tons of grain and other farm products. Our food exports in 1945–46 exceeded 17 million long tons. Shipments in such volume cut into domestic supplies and combine with high domestic buying power to cause price increases. If the country had only to think about keeping prices down, it might want to reduce its emergency food exports; but it desires also to alleviate the world-food crisis as a step toward restoration of peace and trade. Naturally, the operation is costly, and the civilian feels it pricewise; but he should not confuse the effect of our world-relief program with that of Government purchasing for price-support purposes.

As a matter of fact the agricultural price-support program, now in effect only to a small extent, can scarcely become fully operative until

the world food emergency tapers off. It may then come into play for many more commodities than those covered at present. Conditions then, it should be evident, would be conditions of potential agricultural surplus, sharply different from those that give agricultural prices their buoyancy at present. Price support available to farmers would be protection to the Nation against a serious and dangerous decline of agricultural buying power.

The Parity Ratio

High domestic and foreign demand for farm products have continued to exert strong upward pressure on prices received by farmers. These prices increased sharply following the removal of price controls in the summer of 1946. The index of prices received by farmers established successive new record highs in October 1946 and March and September 1947. The average for 1947 is about 18 percent higher than 1946. Both crops and livestock contributed to the advance although the percentage increase since the removal of price controls for livestock and products has been about three times as great as that for crops.

Prices paid by farmers (including interest and taxes) have increased steadily since the summer of 1946 and by September were 26 percent above the June 1946 level. The 1947 average is about 20 percent above last year.

The parity ratio (prices received by farmers divided by prices paid, interest and taxes) increased to a record high of 132 in October 1946 but has since declined. The average for 1947 is about the same as last year's 120.

Increases in cash receipts by regions during the first 8 months were extremely diverse. The largest percentage increase was in the West North Central region. A large wheat crop was marketed in this region at high prices and marketings of corn from the record 1946 crop were extremely high. Income from cattle and hogs also made pronounced gains. Cash receipts in the South Central and East North Central regions increased 34 and 29 percent, respectively. Receipts from livestock in these three regions increased by 37, 29, and 28 percent, respectively. These gains were due primarily to an increase of nearly 50 percent in prices of meat animals. Receipts from crops in the three regions rose 54, 39, and 30 percent, respectively.

Total receipts in the North Atlantic region went up 20 percent, and receipts from livestock and products 22 percent. This relatively low percentage increase for livestock was due to the preponderance of dairy and poultry products among livestock products in this region, prices of which increased much less than did prices of meat animals. Cash receipts in the South Atlantic region were up only 5 percent, livestock rising 17 percent and crops falling 3 percent. The small gain in total receipts in the South Atlantic region was due in part to declines in income from citrus fruits and tobacco which more than offset gains in cotton, wheat, and other products.

Percent increase in cash receipts from farmers marketings January-August 1946 to January-August 1947 (preliminary)

Region	Total	Livestock	Crops
	Percent	*Percent*	*Percent*
West North Central	42	37	54
South Central	34	29	39
East North Central	29	28	30
North Atlantic	20	22	14
Western	16	23	11
South Atlantic	5	17	−3
United States	27	29	25

AGRICULTURE'S FINANCIAL AND OTHER ASSETS

Agriculture in the United States now stands financially at the highest point in its history with assets almost double those of the prewar years. Between January 1, 1940, and January 1, 1946, the value of the land, buildings, livestock, and equipment employed in agriculture rose from 53.7 billion to 101.6 billion dollars. This was an increase of 89 percent. Even more striking was the increase in the proprietor's equity in agriculture—the value of assets not offset by debts. This value rose 49.5 billion dollars between 1940 and 1946 or 113 percent. Almost half this increase, however, came from a mark-up in the value of farm land and buildings. It reflected simply a rise in price levels. The productive condition of farm property had deteriorated.

Farmers increased their holdings of cash and savings bonds from 4.2 billion to 19 billion dollars. Meantime, they reduced their debts from 10 billion to 8.3 billion dollars. Percentagewise, cash and savings bonds held by farmers increased 358 percent; the value of their livestock, inventories, and equipment rose 63 percent; the value of farm land and buildings increased 68 percent; farm debts declined 17 percent. These figures do not cover 1947; but farmers in general this year lost no ground financially. Livestock and land values continued to rise; farm income remained at a high level. Farm debts began to increase but remained relatively low.

This rise in the values of agricultural assets at the beginning of 1947 was offset slightly by a small increase in farm debt, the first increase since 1941. Farm-mortgage debt turned upward from about 4.7 billion dollars on January 1, 1946, to nearly 4.9 billion on January 1, 1947. Non-real-estate debt expanded from 3.1 to 3.5 billion during the same period. Proprietary equities of farmers in agriculture continued to grow because of the relatively greater rise in the value of assets. These equities at the beginning of 1947 amounted to nearly 103 billion, constituting 92 percent of all assets. The equities or interest of creditors in agriculture had shrunk to 8 percent of total assets.

Much of agriculture's financial strength reflected a further rise in agricultural prices. For the war period as a whole, an important contributory factor was a decline in farm indebtedness, in marked contrast with the trend during the First World War. Between 1940 and 1947 total farm debt declined 1.6 billion dollars or 16 percent; whereas

in the World War I period (between 1915 and 1920) farm-mortgage debt increased about 70 percent while non-real-estate debt to banks more than doubled. Total farm indebtedness is much below that of 1940, and still further below the level of 1920. This represents a real improvement in agriculture's balance sheet, the advantage of which may hold throughout the postwar readjustment.

It would be rash to conclude that high farm incomes and high farm asset valuations will continue indefinitely. Yet, we should not assume, because agriculture fell into a deep depression after the First World War, that it must do so again. Historic parallels, though often instructive, may deceive. The present postwar period presents similarities with that of 1920 but it also presents differences. The current low farm indebtedness, a main difference from the situation after the last war, can be a factor of great agricultural strength in the years ahead. Though the long decline in farm debt has apparently ceased, we may hope that debt will not go beyond agriculture's repayment ability. Most farmers know that heavy debt charges spell danger, and show a disposition to avoid speculative borrowing.

Production Also at High Point

In its production as well as in its finances our agriculture is at a new high. Output of crops in 1946, on a harvested acreage slightly smaller than in the preceding 3 years, was an all-time record. Production goals for 1947 call for smaller production of eggs, potatoes, and commercial truck crops but for increased production of sugar beets, flax, and soybeans and for as much grain and livestock production as the available acreages and livestock numbers will permit.

The outlook for agriculture in general continues to be good. Consumers in the United States demand farm products at about wartime levels, and the foreign demand is strong. Agriculture in Europe and Asia has not nearly recovered from the war; world import requirements remain high. The world still calls for American wheat and other grains abroad as fast as we can ship them.

Our farmers are maintaining their high level of production with much of their machinery old and in need of replacement, and with fewer workers on farms than before the war. Evidently they are not at the limit of their production capacity. As compared with their prewar output, the farmers of the United States are producing enough food to give 50 million additional people a diet equal to this country's prewar average.

Supply Adjustment Difficulty May Recur

We cannot expect always to strike an exact balance between production and demand. Demands cannot be predicted absolutely; and on the supply side, the weather causes uncontrollable variations. Also, we have price commitments that sometimes push production out of line with demand. Potatoes have recently exemplified this fact. The potato problem and related matters should not blind us to the need for continued full production in 1947. But such matters warn us that at some time in the future the difficulty of balancing demand and supply

may be much greater than it is now, and may focus attention strongly on ways and means of keeping agriculture's markets expanding. The other way of adjusting the balance, the way of crop limitation, is really only maladjustment.

The war and its aftermath have levied toll on our soils, grasslands, forests, farm buildings, and other agricultural equipment. Our prewar efforts to establish a permanent agriculture left us far short of the goal. In the war years and since the war we inevitably gave some ground; and we did so not merely in a figurative sense. All-out production was costly in terms of soil, grass, and trees. Physically it cost us some ground which as soon and as fully as possible we must regain. As yet, we have scarcely begun the necessary shift from emergency production back to permanent, balanced farming. We must catch up with conservation.

Wartime Damage to Resources

We have important indications of what the war did to our agricultural plant. For example, Corn Belt farmers altered their crop rotations to increase the annual acreage of tilled crops, such as corn and soybeans, at the expense of good sod and pasture and close-growing crops. Simultaneously they increased their use of fertilizer, as did farmers in many other parts of the country. Nevertheless, the change in rotation reduced the amount of organic matter in many fields and stepped up the rate of erosion. More use of fertilizer did not correct that. Expansion of wheat in the Great Plains meant reduced acreages of grass and fallow land; it was a handicap to sustained production, partly from the attendant increased liability to wind erosion. Parts of the range suffered from overgrazing and from an increase in crop acreages.

The 1947 production goals call for tilled and close-growing crops on 313 million acres. More than half this area needs increased soil-conserving practices. These include greater use of lime. We are probably not using quite half as much as the soil needs each year. Also our soils need much more phosphate than they are receiving. Liming and fertilization are essential for soil maintenance and for the development of balanced farming systems.

In the war years our farmers doubled the acreage under contour farming. Yet the contoured acreage is still less than 20 million. At least 150 million acres should be farmed on the contour. Strip cropping, the use of green-manure and cover crops, and stubble mulching need to be expanded considerably. We need twice as many farm and ranch ponds as we have built. We need a fivefold increase in range and pasture seeding, in the draining of land, in the preparation of land for more efficient irrigation. About one-third of the existing farmhouses and farm-service buildings need major repairs. Thousands of new farm buildings are needed. Thousands of other farm buildings need better water supply, better heating facilities, and other improvements. Our farms for several years will need 50 percent more lumber than they are getting; specifically, an additional 2 billion board feet of lumber per year.

Farmers badly need more equipment. Machinery on farms increased in volume 26 percent from 1940 to 1946. Much of it, however, was old before the war began and would have been replaced long ago had replacements been available. Some 400,000 tractors are in such poor condition that the owners would like to discard them. Farmers need a vast number of new tractor implements and machines powered by tractors; also many new cars and trucks. The farms now have only 10 million horses and mules, as compared with 14.5 million in 1940. Maintenance of necessary draft power is largely a machinery problem. Fifty-three percent of the farms now have electricity, as compared with only 10 percent in 1935; but most of the remaining 47 percent are clamoring for electric power. Loan applications to REA this year will exceed 225 million dollars.

Compared with the prewar situation, the farm plant is now made up of fewer farms, and fewer people live on them. Above 6 million in 1940, the number of farms in 1945 was less than 6 million. Only in the Northeast, the South Atlantic, and the Pacific regions was the number of farms greater in 1945 than in 1940. The increases in those regions largely reflected sharp increases in farms of less than 10 acres. Farm population in 1940 was 30.3 million. In 1946 it was 26 million or almost 15 percent less. Fewer farms and fewer farm people were doing a bigger farm job and this seemed to be the line of progress.

One-third of the United States is forest land. Three-fourths of the forest area is suitable and available for growing merchantable timber; some of its supplies livestock forage as well. All of it many help to protect soils, watersheds, and wildlife and provide recreation. But we have permitted 75 million acres or about 16 percent of our commercial forest land to be denuded. Only 10 percent of our commercial forest land is old-growth saw timber, and both the volume and the quality of saw timber are deteriorating. Our forests are growing saw timber at the rate of 35 billion board feet per year. The annual drain—from cutting, plus the loss from fire, insects, disease, and so on—is about 54 billion board feet. This means the drain exceeds the growth by about 50 percent. Under full employment we need about twice as much saw timber each year as we are now growing. We need more good forestry practice over the greater part of our forest land area, along with full maintenance of such practices where they now exist.

Possibilities in Next Few Years

How far can we go by say 1950 toward using the land properly, making the necessary postwar acreage adjustments, and improving the level of human nutrition? It appears from studies in this Department that even with continued high employment in this country we shall need by 1950 about 17 million fewer acres of cultivated crops than the acreage called for in our goals for 1947. Presumably the foreign demand will then be smaller. We can use a greater acreage of good pasture and some more land in hay crops. In short our farmers will probably be able to shift some of the poorer land into uses safer than the present ones. But this will represent only the beginning of a better system of land use.

With food demand high in 1950 farmers might want to have as much as 337 million acres in cultivated crops and hay. Farmed by present methods, that much crop acreage would involve considerable danger of erosion and other damage. Possibly less than 164 million acres could be safely devoted by prevailing methods to the intensively cultivated crops. Such crops are notoriously hard on the soil. Under proper methods, considerably more land could be safely cultivated—certainly as much as we are likely to need in the foreseeable future. But such methods will not be sufficiently in use by 1950. We shall still be a long way from a permanently productive agriculture. We may be making considerable progress toward adequate diets. Such progress would call for considerably more livestock production than we have now, and consequently for a more conservational use of the land. Roughage consuming animals take land out of soil-depleting crops.

In fact most farm adjustments that promote better nutrition favor permanent agriculture. Many such changes also use recent technological improvements. They would seem to be just what the country needs. But they assume good economic conditions—strong demand for farm products. Bad economic conditions and a weak demand for farm products point toward farming of the wasteful, soil-depleting kind. Good farming is not the responsibility of just the farmers. It is something to which the entire economy contributes or does not. Good farming requires an expanding economy, with high-level industrial activity and free-moving world trade. In proportion as the urban branch provides that, it provides the basis of a forward-looking agricultural program.

OPERATIONS OF CCC IN FISCAL YEAR 1947

The most important activity of the Commodity Credit Corporation during the fiscal year 1947 was the continuation of procurement and delivery of huge quantities of agricultural products for shipment abroad. With the exception of those for sugar, all subsidy operations were discontinued. Purchases of commodities for price-support were small in volume with respect to most commodities because of continued strong demand and high prices.

When the fiscal year 1947 began, the book value of inventories on hand amounted to $651,373,036. During the year, acquisitions of commodities totaled $1,956,541,476. Wheat, corn, other grains, and grain products made up almost 40 percent of this total. Sales of commodities amounted to $2,303,277,051 during the fiscal year, leaving inventories with a book investment of $447,898,188 on hand June 30, 1947.

The largest single item in inventory on that date was wool, which accounted for over half of the total. The large stocks of cotton acquired by the Corporation in prior years were almost entirely liquidated. Aside from wool purchases, which totaled over 162 million dollars, the principal items purchased under the price-support program during the year were dried and frozen eggs, dried milk, and potatoes.

Price support loans made during the fiscal year 1947 totaled $277,790,232, or 55 percent more than during the preceding year.

Loans on tobacco amounted to over 85 million dollars; on potatoes, almost 64 million dollars; and on peanuts, over 34 million dollars. Loans on corn, wheat, and cotton, which in past years have amounted to over 90 percent of all loans, totaled only 78 million dollars or 28 percent of the loans made in fiscal year 1947.

The Congress, by an act approved February 18, 1946, appropriated 500 million dollars for the postwar price support of agriculture. It was directed that this sum should be paid to CCC and continued as a reserve fund for use when necessary. A charge of $59,950,696 was made against this fund as of June 30, 1947, representing losses recorded on price-support operations from January 1, 1947 to the end of the fiscal year.

After the net loss on price-support operations during the 6-month period was charged to the reserve provided by Congress, the Corporation showed a net gain for the 1947 fiscal year of $203,727,019. This latter amount includes the net gain of $178,697,602 on the war-time supply program (GCP program) to the date of its liquidation as of June 30, 1947.

CROP INSURANCE

Every year floods, drought, insects, plant disease and other unavoidable hazards rob many farmers of their harvests. So that throughout the nation the impact of crop failure may be lessened and that farmers may enjoy a measure of the economic security enjoyed by other enterprises, the Department of Agriculture through the Federal Crop Insurance Corporation has had the responsibility for developing and furnishing crop insurance for the producers of various agricultural commodities.

All-risk crop insurance protection was available on a nationwide basis in 1947 to producers of wheat, cotton and flax. It was also available on an experimental basis to producers of corn and tobacco in 19 counties each. This is the eighth crop year of insurance on wheat, the fifth year on cotton, and the third year on flax. It was the third year of trial insurance on tobacco and corn. About 3,000,000 individual crops were protected by Federal Crop Insurance during these years; approximately one-fourth as many farmers had the impact of crop failure lessened through the payment of losses.

PLANS OF INSURANCE

Under Federal crop insurance, producers of insurable crops were protected against loss from essentially all unavoidable production hazards. This protection as it applies to wheat and flax was against loss of yield, with an optional coverage of either 50 percent or 75 percent of the long-time average yield on the farm. In cotton, likewise, the protection was against loss of yield but there were three optional levels of coverage. These levels approximate 40 percent, 60 percent, and 75 percent, of the average yield on the farm. Production of cottonseed was insurable, insured by payment of an additional premium.

Two plans of insurance were tried on tobacco and corn. One plan on tobacco guaranteed the producer a monetary return from his

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crop of not to exceed the value of 75 percent of the average yield. The value was computed on the basis of a representative or average price for tobacco in the year of insurance, with adjustments upward or downward to reflect the experience on the farm in prior years in selling at prices above or below the market average. The other plan guaranteed the producer a return in dollars of not to exceed 75 percent of the investment in the crop.

One plan of corn insurance also guaranteed the producer a return in dollars of not to exceed 75 percent of the investment in the crop. The other plan for corn guaranteed the producer a yield of not to exceed 75 percent of the average yield established for his farm.

PARTICIPATION

In 1947 over a half million producers availed themselves of the all-risk crop insurance protection. The total insurance in force amounted to approximately 500 million dollars with premiums earned of about 51 million dollars. Of the total number of producers insured, approximately 360,000 were wheat farmers; 122,000 were cotton farmers, and 35,000 were flax farmers. Of the remaining number, which included insured producers growing tobacco and corn in the few counties in which this insurance was offered, 15,000 were tobacco farmers and 7,000 were corn farmers.

EXPERIENCE

Experience under the 1946 programs was the latest that can be given here. Payment of losses under the various 1946 programs was practically complete in 1947 and the results of the operations were rather clearly indicated.

Under the 1946 wheat, corn, and tobacco programs the operating results showed a substantial premium reserve over indemnities paid out. For wheat and tobacco this was the second consecutive year in which reserves were carried over.

In 1946 net losses accrued from operations under the flax and cotton programs. For flax insurance the premium collections stated in bushels were only slightly less than the total indemnities expressed in bushels. However, an increase in the price at about the time loss claims were being paid, over the earlier price on which premiums were based, resulted in somewhat heavier losses on a monetary basis.

Losses under the 1946 cotton insurance program were approximately 80 percent of the total 1946 indemnities for all commodities. These heavy losses were due to various causes, chiefly unfavorable weather conditions over most of the cotton belt. Excessive rains and the related problem of heavy boll weevil infestation occurred in Eastern Texas and over most of the other cotton states East thereof. Also in the same year serious drought conditions developed in the South Plains area of Texas where there was a heavy concentration of cotton insurance.

Losses under the 1947 program are undetermined at this writing. But farmers harvested one of the largest wheat crops of record. Premium collections under the 1947 wheat program may exceed indemni-

ties for the third consecutive year. A generally better season for cotton throughout the cotton belt, together with program changes initiated in 1947, will probably result in fewer losses than in 1946. Indications for other insured commodities are not yet clear.

Program Changes

Beginning in 1948 crop insurance will be considerably restricted. Recent legislation in the form of an amendment to the Federal Crop Insurance Act places the entire crop insurance program on an experimental basis. This change in the scope of operations stems from a recognition of the complexities of developing a sound crop insurance basis and a belief that there remain many problems to be worked out before we can justifiably assume the liability of nationwide programs. Under the new legislation crop insurance is limited to 200 counties for wheat, 56 counties for cotton, 50 counties each for flax and corn, and 35 counties for tobacco. There are also provisions for including on an experimental basis other crops on which insurance has not heretofore been offered. Under an experimental program greater emphasis will be placed on evaluation of various plans of insurance and a critical analysis of problems associated with operating a program.

FOOD REQUIREMENTS AND PRODUCTION CAPACITY

The buying habits of people who have comparatively good incomes give an indication of what the people in this country want to buy under normal conditions. What should we regard as the lower limit of a reasonably good family income? At 1941 prices, 2,000 dollars per family would not be too much. That is less than 40 dollars a week per family. But in 1941 the families that had incomes of 2,000 dollars or more were just the top 40 percent. Such families, however, could afford a generally adequate diet.

Let us take their buying as representative of what the people of the United States want, and apply the standard to the whole population. It indicates that people want about 40 pounds more meat per capita than they got between 1937 and 1941; that they want about 200 pounds more milk; about 9 pounds more chicken; about 23 or 24 pounds more fresh vegetables; about 17 pounds more processed vegetables; about 50 pounds more citrus fruit; and about 80 pounds more of other fruits. It seems they want less beans and less potatoes. Probably they would buy more cotton products, tobacco and wool per capita. We do not have the precise measure for these products.

Fulfilment of these wants, plus conservation demands for export and for industrial uses, and allowing for imports, calls for above 420 million acres in crops, orchards, rotation pasture, and fallow land. This is almost exactly what the 1947 production goals requests, and about 10 million acres more than the 1937–41 average. It is the crop acreage we would need if all our families had incomes equivalent, at 1947 prices, to the incomes received by the top 40 percent of our families in 1941. The estimate assumes average weather and a trend toward more efficient production.

However, the use of this acreage would be different from what it was before the war and different even from last year's use of the land. There would be more livestock farming, and consequently more land in pasture and hay—less in small grains and potatoes and beans. Feed grain acreage would change little. Acreage in soybeans would be less than in 1947. But acreage in cotton, truck crops, and orchards would be greater. Forest products are crops; one-third of our land is in forests. Under full employment we should need 65 to 72 million board feet of saw timber per year. We grow it at only about half that rate. These assumed requirements allow very conservatively for exports.

Reckoning what the whole United States population wants by the actual food buying of persons in the upper 40 percent of our prewar income groups, we conclude that our people would like to be able to buy one-third more food than they had, on the average, in the years 1935–39. Our food consumption per capita, in 1946, was 16 percent above prewar level; it had advanced to a point that was about half way to the indicated desire. This was an accomplishment during a world food emergency which necessitated great exports of grain and other foods. It shows therefore that the United States does not lack capacity to feed all its people well. Food consumption in recent years has brought some surprises. Our people have used much more milk than ever before—from a fourth to a third more. They have indicated a wish to eat much more meat—the demand has surprised the livestock industry. In 1944 Americans at about 23 pounds more meat, per capita, than in prewar years; this year they may eat 25 to 30 pounds more—at least a fifth more than prewar. Many people assumed wartime production of eggs exceeded any conceivable peacetime demand. Consumption of 392 eggs per capita in 1945 as compared with the prewar average of 298 seemed attributable to the meat shortage. But in 1946 we ate about 380 eggs per capita plus 15 percent more meat than before the war. In the first quarter of 1947 the consumption was at a record rate. On the average during that quarter, Americans ate more than 100 eggs apiece.

Need for Continuing Opportunity to Produce

Our agriculture is able to meet the people's wants and in doing so it contributes to the Nation's prosperity. We must see that it has a continuing opportunity. It will take as much agricultural production as we have now to supply just the reasonable needs of our own people plus industrial uses and exports. This is possible with progressive improvement of our natural resources. Here is a practical objective toward which we ought to build. Neither agriculture nor the Nation can afford to accept less.

In recent years we have seen a revolution in our agricultural production. There can be no turning back. This revolution continues. As compared with prewar years it has given us an increase of one-third in our farm production for the market—enough more food to provide 50 million additional people with a diet equal to that of the prewar years. Overcoming a scarcity of production supplies, of equipment, and of farm workers, the revolution has accomplished its

results largely by using machinery and scientific knowledge. Give the weather all the credit possible, and we still have a technical miracle. Farmers will not discard their machinery; on the contrary they will buy and use as much as possible. They will continue to plant the crops and follow the practices that increase yields and reduce unit costs. Moreover, research and engineering have not reached their limit. They foresee new possibilities.

Evidently farm production is destined still further to increase. Surplus control measures in the 1930's, let us not forget, brought shifts in types of production; it did not reduce the total output. Acreage reduction had a considerable offset in crop shifts to the better acres. Hence yields stayed up. Moreover, less of one crop meant more of another and only drought could substantially change the total output. Farm production in the United States persists and seeks new high levels, and all we can do is to develop a pattern of production that will use our resources desirably. We have no practical alternative to organized plenty.

Care of Resources

Requirements of our resources reinforce this lesson. We can protect our soil and, at the same time, grow a better diet for our people. Production of beef and dairy cattle and sheep depends on pasture. Even hog production makes heavy use of pasture. Pasture is soil conserving. Livestock farming, with its basis in ample well-distributed income, protects soils and uses land that might otherwise grow surpluses. It takes from four to seven or more times as much livestock feed-grain to provide one person with a diet of livestock products as it does to supply him with a food-grain diet. Hence, when foreign demand for grain declines, the livestock economy can help to ward off the development of a grain surplus.

Study in the Department of Agriculture shows that of the cropland used to produce the civilian diet in the war years 1943 through 1945, about 80 percent was used in the production of livestock products. Not more than 20 percent of the land used to produce civilian food was in crops for direct human consumption. With yields per acre at present levels, our cropland would not support our present population if all civilian families had the same diet as the high-income families. Our cropland with yields as at present would support possibly 190 million people on a *low-cost* diet. It would support only about 140 to 150 million people on a *liberal* diet. With average yields, about two acres will produce the food required by one person for a low-income diet, it takes three acres or more per person to supply the food for a liberal diet. The farm surplus problem would not reappear generally if all our people had the means to eat what they want.

After the world food emergency subsides, it will take about 300 million acres in intertilled and close-growing crops to produce the food our people want and to provide for reasonable exports. About 180 million acres, however, is subject to some erosion damage. Only about 120 million acres can be used for such crops without doing some damage. With better farm management systems and practices, and

with a pattern of production that emphasized soil-conserving practices and livestock enterprises, we could produce enough and get the soil budget into balance. Ultimately, by such methods, we could have close to 450 million acres in safe continuous use as cropland. But we have farther to go now than we had before the war to establish a permanent agriculture; in planning for adequate production we must not forget the sources of production. Utter failure would meet us that way in the end.

Farmers in the Corn Belt altered their regular rotations during the war to increase the annual acreage of tilled crops such as corn and soybeans to 11 million acres—mostly at the expense of good sod and pasture. Wheat growers, mainly in the Great Plains, increased their crop acreage from 62 million to nearly 72 million—mostly at the expense or grass and fallow. Parts of the range suffered under increased numbers of cattle and increased acreages of crops. Over the country as a whole about half the acreage required this year for intertilled and close-growing crops is subject to erosion.

Use of lime and phosphate and use of various conservation practices such as contour farming, strip cropping, and turning under green manure increased during the war. But the soil's requirements call for double, fivefold, and even greater increases in these of these materials and practices. Sustained effort in conservation calls for a high level of food-buying power, so that the composition of the crops will emphasize livestock and other soil-conserving enterprises. Low food-buying power puts a premium on soil-depleting uses of the land—in extreme cases on excessive production of food grains.

Having Abundance Means Using It

Paradoxically we must find ways to use our abundance, in order to have abundance in the future. The short way to become a have-not nation is let consumption go down and surpluses pile up. Producers then neglect and at the same time drain their resources in order to live. Using our agricultural resources does not impoverish us; misusing them does. We have an opportunity to use our resources without misusing them, and to produce an adequate supply of what the people want by means that help to assure plentiful resources for the future. A policy of abundance is immensely practical and no practical alternative exists.

First, we must gear our agriculture to developments in other segments of the economy. Agriculture can help to maintain good conditions there; it supplies important raw materials and part of the market for industry. Briefly, agriculture can forward the policy expressed in the Employment Act of 1946—to promote employment, production, and purchasing power. This involves agricultural cooperation in programs to maintain stability of prices at levels fair to both producers and consumers. This is not an empty phrase despite the fact that producers and consumers look at it from different viewpoints. Any serious departure from the principle *prevents* abundance.

The business cycle has its ups and downs, even in periods of general prosperity; farm prices are sensitive to these fluctuations. Commodity price floors are therefore necessary to protect producers. This

does not call for *rigid* price relationships. The House Special Committee on Postwar Economic Policy and Planning, sounding a warning against the danger of pricing commodities out of the markets, said that needed long-run adjustments in agriculture are "not necessarily accomplished by present price support programs together with systems of production quotas." It spoke of the need to meet producers' problems by *expanding* both markets and production. Experience of recent years has pointed to the need for price relationships that encourage necessary changes in production in line with changing conditions of production and demand and to the need for modernization of the parity formula.

Floor Under Consumption

To provide continued assurance that abundant production will be used, we need a floor under the consumption of farm products. Our school-lunch program is a start. We need something more, however, to counteract slumps in the demand, to absorb products temporarily too abundant and to assure an adequate diet for all groups. This will require some kind of a surplus-distribution program. Along with it there will be need for action to stabilize supplies from year to year. Agriculture cannot hit production goals exactly, since both the weather and the demand change. Guideposts like our production goals indicate particular needs, and help farmers shift the pattern of production through concerted action.

CONSERVATION OF RESOURCES

Our productive land is an impermanent and irreplaceable resource. In the public interest we must maintain it as fully as possible, so that it may continue to serve as the foundation of our agriculture, as a major source of national wealth, and as a means of national health and strength.

The Soil Conservation Service estimates that half of the cropland we are using this year is subject to erosion in greater or lesser degree. Despite more than a decade of widespread application of lime and phosphate and the use of such practices as contour farming, strip-cropping, terracing, and turning under green manure, the land still needs an intensification in the use of all of these materials and practices. Every year erosion and depletion still rob us of productivity on hundreds of thousands of acres.

Forage production on over 900 million acres of pasture and range lands is a substantial element in the production of meat and wool. Western range livestock numbers have all too commonly been too high and the range lands have suffered as a result of overuse. This is adversely affecting many of our important watersheds, where irrigation agriculture is at stake.

Our timber supplies, too, are endangered. One-third—or 624 million acres—of the United States is forest land. Our recent reappraisal of the forest situation confirms our belief that our forest potential is great enough, under proper management, ultimately to meet domestic needs and provide a margin for export to a world that is undersupplied

with timber, as it is with food; but present growth of timber is far below this growth potential and far below our own needs.

The rate of saw-timber drain is one and a half times the rate of growth. Unsound cutting practices and losses by fire, insects, and disease are wasting our timber resources. Growth for saw timber should be from 65 to 72 billion board feet annually, or nearly double the present rate. Even with an adequate program, started promptly, it will take many decades to attain this goal.

Our reserves in the soil and forest banks are being steadily diminished. We are living off our capital.

American agriculture, after a century and a half of rapidly expanding acreage, now finds that it has reached the limits, practically speaking, of its land resources. Comparatively little additional land can be brought into cultivation. True, some 10 million more acres could be brought under irrigation, and perhaps as much as 50 million more could be reclaimed by appropriate drainage; but much of our efforts will consist of converting land from one use to another use as the occasion may demand. Our land resources are under our feet today. That is, from now on we must live with the resources at hand, and because we are steadily allowing our soil resources to wash away and over-cutting our timber resources, the need for a comprehensive permanent conservation policy can no longer be ignored.

The United States is better off, from the standpoint of productive land, than most nations. There are only about 4 billion acres of immediately arable land in the world. The productivity of a great part of this land is only fair to medium. Some of it is poor. Yet we must count on this land to feed a world population of more than 2 billion people that is increasing at the rate of about 20 million per year. This gives us less than 2 acres of arable land for each person in the world, which is not enough to furnish an adequate diet for all the people at the present rate of food production.

But even in the United States we cannot hope to maintain our present standard of living if we continue to permit our land to deteriorate. After soil is washed from the fields and pastures of our farms it becomes erosion debris that piles up in reservoirs, covers productive bottom lands with silt, clogs drainage and irrigation ditches, and obstructs stream channels and harbors. The cost of such damage from siltation amounts to many millions annually. For example, the estimated damage to some 10,000 principal storage reservoirs of the Nation is about 50 million dollars each year. Great additional damage results from the overwash and swamping of agricultural lands along streams. Furthermore, soil erosion from farm lands helps to contribute to flood damage downstream to an extent that is difficult to estimate. The erosion debris helps to swell the total volume of flood waters and adds to the expense of cleaning up the flooded areas that are left with large deposits of silt.

Progress In Combatting Soil Losses

We have made remarkable progress in our national program of soil and water conservation since 1933. During the first few years of its operation, most of the efforts of the Soil Conservation Service were

expended toward demonstrating the practicality of complete conservation planning and treatment for entire farms and groups of farms. These demonstrations of proper and complete conservation treatment—whereby each acre is used according to its capabilities and given conservation treatment according to its needs—proved so successful and popular that by 1937 the various States began to enact laws to permit the creation of legally constituted soil-conservation districts to help carry on such work under local leadership and responsibility.

The idea of having local conservation districts of nonpolitical nature and governed by local people administer the soil conservation program proved overwhelmingly popular. By 1946 all 48 States and Puerto Rico had passed laws to permit the creation of such districts wherever the local farmers and landowners desired to do so. As of June 30, 1947, there were, in all, 1,865 soil conservation districts and 24 other conservation districts of various types that were devoting their main efforts to soil conservation. These districts include a total area of slightly more than 1 billion acres. More than 4,450,000 farms are contained in these districts—this is more than three-fourths of the farms in the Nation. And soil conservation districts are still being created at the rate of about 20 each month.

Since the first soil conservation district was organized, technicians of the Soil Conservation Service, working with individual farmers in these district, have developed complete conservation plans for more than half a million of the Nation's farms—approximately 135 million acres. These conservation farm plans were developed by the technicians and farmers working together on the land. They include specific recommendations as to how each acre of a farm should be used according to its capabilities and as to the kind and intensity of conservation treatment needed to each acre, and are the blueprints for permanent conservation farming that not only fit the needs and capabilities of the land but also fit the needs and desires of the farmers.

The complete conservation treatment recommended by the farm plans for these 135 million acres has already been applied to the land on more than 72 million acres. Practically all of the remaining 63 million acres are now receiving the treatment needed. Usually, the needed conservation measures can be installed on a tract of land within 1 or 2 years after a plan has been made. In some instances, however, it may take 5 or 6 years to make all the proper changes in land use and to build all needed conservation structures on a farm.

In addition to the conservation planning and treatment done in soil conservation districts conservation plans have been developed on some 57 million acres and treatment has been completed on about 38 million acres outside these districts by Soil Conservation Service technicians. Most of this work was done prior to 1940, before districts were generally organized over most of the Nation. This means, that up to date, we have complete and permanent (except where short-sighted people may choose to abandon their conservation farming methods) soil protection on more than 110 million acres. And more than 60 million additional acres have made for them the complete plans that should be fully executed within a few years. Also, detailed conservation surveys that show the capabilities of each acre of land have been completed on more than 250 million acres. These surveys

are the basic land inventories that will serve as a guide for future conservation planning.

Participation in ACP

Conservation practices on a Nation-wide scale have been carried out since 1936 by farmers under the Department's agricultural conservation program (ACP).

This program resulted from general realization of an urgent need to save our soil and its productivity. In the early thirties, joint efforts by farmers in balancing their output with demand evoked repeated recommendations by agricultural workers that the land thus withheld from uneconomic production should be put to soil-conservation or soil-building uses. The ACP was the Nation's response—a Nation-wide attempt to maintain and rebuild the country's soil and water resources. ACP gave to all farmers in each of the country's 3,000 agricultural counties, as well as to farmers in Puerto Rico, Alaska, and Hawaii, opportunity to participate in this vital conservation effort.

Experience has proved that neither an awareness on the part of farmers of the need for conserving soil and water nor technical advice about needed conservation practices and how to carry them out is enough to get the job done.

For one thing, one-third of our farm operators are tenants, whose short-time interest in working the land frequently conflicts with the long-time conservation interest of the Nation. The tenant's immediate need is a livelihood; he cannot afford to take money from his earnings in order to build up soil which next year someone else may be using.

Moreover, relatively few farm operators have the resources required to install conservation measures necessary for their welfare and that of the Nation.

Farmers are better off financially than they have been. But many still have inadequate incomes. According to the last Census of Agriculture, gross farm income (products sold and value of those used on the farm) in 1944 was less than $400 for 24 percent of the country's 5¾ million farms; more than half of our farms had gross farm incomes of $1,500 or less; two-thirds of our farms averaged only about $900. Most small farms have gained relatively little from the upsurge in prices since 1944.

Through the Agricultural Conservation Program the Government manifests the obligation of the whole people to share the responsibility, as well as the benefits, of assuring the continued productivity of our soil. This program helps farmers, with money or conservation materials or services, to accomplish specified conservation practices.

The soil-building and conserving practices for each State are recommended by State ACP committees after State technical committees have approved them as practices which will contribute to agricultural conservation within the State. To qualify as eligible program aids, the recommended practices must be such as are not likely to be carried out without assistance. Many practices, though recognized by soil conservationists as valuable, do not meet this requirement, and the

program accordingly does not assist them. The program seeks to make technical assistance available where it is needed.

Assistance under the ACP program is available to farmers located outside Soil Conservation districts as well as to farmers located within such districts.

Agricultural producers who received assistance under the program in 1946 operated around 2,850,000 farms and ranches embracing 308 million acres of cropland or about two-thirds of the Nation's total cropland. The volume of practices completed in 1946 was the largest ever carried out under the program. These practices had to meet one or more of the following standards. They had to (1) maintain or increase soil fertility, (2) to control or prevent erosion, (3) to conserve and make better farm use of water, and (4) to conserve and improve range and pastures. Farmers have borne an increasing share of the costs of program practices. Varied according to practice and areas, the farmers' share in general in 1946 had grown to roughly one-half the total cost.

There is an expanding benefit from the program. For instance, during the 11 years 1936–46, cooperating farmers were helped to build 672,000 miles of terraces—about 27 times the circumference of the earth. They were assisted in developing green-manure and cover crops on 169 million acres, as well as about 56 million acres of interplanted summer legumes and natural cover; in applying 155 million tons of limestone and 13.1 million tons of 20-percent phosphate to establish protective cover; in farming 79 million acres of intertilled crops and 24 million acres of close-seeded crops on the contour; in strip cropping 55 million acres; in establishing or improving pastures by seeding 33 million acres; and in building 679,000 dams and reservoirs for stock water, erosion control, and irrigation.

Terracing and the construction of dams and reservoirs must usually be maintained but not repeated; this work represents conservation gains of lasting national benefit. Many other soil-conservation practices must be carried out annually in order to obtain effective conservation. Hence the acreages enumerated below in some cases include those for which assistance was given in more than one year. The program seeks to assist the farmer in carrying out key practices for effective conservation farming. County committeemen are urged to discontinue giving assistance for these practices, once they have been established, and thereafter to emphasize other needed practices.

Important practices completed under the 1946 program, when compared with those of 1938, indicate substantial progress:

Practice	Extent	
	1946 (preliminary)	*Percentage of increase over 1938*
Green manure and cover crops—million acres	21	91
Application of limestone—million tons	27	441
Application of phosphate—do	2.6	566
Contour farming intertilled crops—million acres	7	49
Contour farming close-seeded crops—do	4	265
Strip-cropping—do	7	839
Establishing or improving cover on pasture by seeding—do	4	211

During May and June of 1947, program operations had to be suspended temporarily because of uncertainty about appropriations.

Conservation work slowed down and indeed practically ceased. It was immediately evident that conservation work in anything like its present volume was dependent on the public's cooperation in sharing the costs. Congressional action permitted the program's resumption in July.

For the coming year, 1948, Congress has authorized the development of an agricultural conservation program to cost 150 million dollars, including administration. The 1947 ACP was developed from a congressional authorization of 300 million dollars.

Conservation Policy

Some important questions need consideration.

First, to what extent can we rely on education and technical assistance only in insuring wise use of land and adoption of conservation measures? In other words, are educational activities and technical assistance enough, or are conservation payments and other measures also necessary?

Direct payments and the furnishing of conservation materials are just as much public investments in conservation as are public expenditures for education and for technical assistance to farmers. Such measures are needed in most farm areas and under certain conditions to achieve the amount of conservation that is desirable in the public interest. The individual should pay for the part of the conservation investment that is clearly of economic benefit to him. But this raises some points. The public benefits from almost all conservation work, particularly as it controls erosion and prevent floods. At the same time, it is doubtful whether even owner-operator farmers are much interested in conservation farming in cases where they get no perceptible immediate increase in returns.

Second, can conservation payments be geared to price-support operation in such a way as to prevent the use of marginal lands, the plowing up of sod, and so forth?

The Department believes that tying conservation performance and conservation payments to price support or other Government assistance programs needs to be considered. Means would have to be devised for certifying conservation performance for eligibility in a price-support program. So far as possible, the farm conservation program should be voluntary and flexible, and it should have a maximum farmer participation in its planning and performance. It looks as if those objectives can be achieved more easily if conservation and price support are separate programs. But many farmers believe that all persons benefiting from price support or similar forms of Government assistance should be required, at least, to observe some simple good farming practices, especially as they relate to conservation.

Third, how can the various conservation activities be integrated? This leads into a broader question—the question as to whether we could devise some means of assuming that all of the conservation activities of the Department were directed toward the same end, farm by farm.

Our present soil-conservation programs, like most of our so-called action programs, were born of emergencies—depression, drought, the

dust storms, the war. The Department is working to facilitate cooperation among all its conservation-minded agencies. This does not call for a whole new program. We do not want, nor do we need, to start over. But an approach is desirable which could be incorporated into all the farm conservation activities of the Department and made available to all farms within a comparatively short term of years. Such an approach might be worked out along the following lines:

Physical essentials on which conservation should be based involve, first of all, an inventory of physical land conditions, including the character of the soil, the percentage and length of slope, the degree of erosion, the drainage and water supply, and the present land use. It is also necessary to determine the several practices which, with local adaptation, will meet the requirements for safe land use and provide the basis for a fully developed farm operation.

This physical inventory and appraisal might be referred to as the *basic appraisal.* This appraisal would not be a complete farm plan since it would not include detailed consideration of either the conservation practices and methods applicable or, equally important, the human and economic factors involved. The extent to which these factors are finally considered must, of course, vary with the aims and objectives of the agency or program concerned.

Although human and economic factors are also involved, all conservation activities, whether they consist of education, technical assistance, or supplying conservation materials, should be based upon a physical inventory and appraisal of conservation needs of the farm or area covered.

Conservation needs vary not only from area to area but also from farm to farm. Conservation practices also vary from relatively simple, easily applied practices to extremely complex or difficult practices which require a high degree of technical skill. It is therefore suggested that:

There are in all areas certain relatively simple practices that can be applied without on-site technical assistance. These simpler practices will differ from area to area, but they can be classified for each area and carried out without technical assistance, both before and after the development of the physical inventory and appraisal.

In the more critical land areas or on farms where there has been considerable damage and where *complex measures*, such as terracing, will be needed to control erosion and maintain the soil, adequate on-site technical assistance is needed, and where at all possible such measures should not be carried forward without an adequate physical inventory and appraisal. The simpler practices could, of course, still be carried out without waiting for technical assistance and the physical inventory and appraisal.

The physical inventory and appraisal of conservation needs should provide the basis for all conservation aid or activities of any or each of the agencies of the Department. The basic appraisal would consist of an aerial photograph of the farm and a description of physical conditions as outlined above, with appropriate arrangements for recording any recommendations made as well as practices actually carried out. It is suggested that development of these basic appraisals

should be concentrated first in those areas which are classed as "serious" or "critical" in terms of land damage.

The physical appraisal and development of conservation recommendations should be carried forward by technicians or adequately trained persons who have proved themselves competent. And recommendations relating to land use and soil practices should be based upon information supplied by the National Cooperative Soil Survey and other research materials relating specifically to the land type or specific area concerned, wherever such information is available.

These appraisals would provide an adequate guide to conservation needs on most farms, especially in areas where conservation requirements are relatively simple. On farms or in areas which need more complex measures, beyond the scope of the basic plans, initiation of these measures would await availability of technical on-site assistance and, where necessary, should be based upon a more detailed inventory of land conditions.

Research would deal with land-management problems and provide new information for educational and action agencies. It would cover field experiments on soil-management practices for crop production, soil improvement, and soil and water conservation; soil chemistry, physics, biology, and plant nutrition; and fertilizer and liming materials. Other studies would develop the economies of conservation as applied to various sizes and types of farms. It may be as important for this purpose to integrate the elements of modern agricultural technology as it is to develop and apply individual elements.

To sum up, we need continuing emphasis on conservation. This should include technical work like that done by the Soil Conservation Service, the use of payments or materials as provided by the Agricultural Conservation program, increased research into conservation problems, and some means of tying all the Department's conservation activities together. With regard to possible methods of integrating conservation activities, a committee created within the Department to consider administrative problems recently advised "the consolidation of the Agricultural Conservation Program activities and the Soil Conservation Activities into one conservation program and agency." In testimony given on October 8, 1947, before the House Committee on Agriculture and a subcommittee of the Senate Committee on Agriculture and Forestry, I concurred in that recommendation.

FLOOD CONTROL

Watershed improvement work in aid of flood control by the Department of Agriculture is now under way again after a wartime shutdown. The Department is assisting Soil Conservation districts in 11 congressionally authorized watersheds to help farm and forest-land owners and operators install the various combinations of measures called for in approved programs. It is doing the job on national-forest lands within those watersheds. This work is expected to be completed in from 10 to 20 years on the watersheds of Buffalo Creek and the Potomac, Coosa, Little Tallahatchie, Yazoo, Little Sioux, Washita, Trinity, Middle Colorado, Los Angeles, and Santa Ynez Rivers.

The importance of and need for such action is recognized by the Flood Control Acts of 1936 and later years. These acts make the Department of Agriculture responsible for investigation and improvement of watersheds and the Corps of Engineers responsible for investigation and improvement of rivers and other waterways. Together the two agencies are a team responsible for all phases of the Federal part of the flood-control job.

Floods start where rain falls. Where water runs rapidly off the land, carrying with it soil from lands not properly protected by vegetative cover and litter or by suitable conservation farming practices, it accumulates quickly in stream channels. If the volume of run-off is sufficient, floods occur and damage is done.

Floods on the Missouri River and its tributaries in the spring of 1947 were responsible for failure to produce normal crops of world-needed food on large acreages of fertile farm lands.

Floodwater and sediment damage was not confined to the Missouri, but the extensive and prolonged flood situation there served to emphasize the risk our Nation continuously takes by delay in installing flood prevention and control measures on the watersheds and in the channels of our rivers and waterways.

Watershed treatment measures to increase the infiltration of water into the soil and to prevent erosion help make it possible to utilize the storage capacity of the soil to retard the rate and reduce the amount of run-off and soil loss. They also provide a means for orderly routing of excess water from the fields and hills, the minor water courses and tributaries down to the main streams.

Some of the important treatment measures are tree planting, seeding of ranges, improvement of pastures, use of conservation farming practices, protection of forests and ranges from fire and overgrazing, and establishment of controlled waterways by use of vegetation and channel stabilization structures. Worn-out and severely eroded lands may be publicly acquired, revegetated, and properly protected and managed.

Watershed Investigations

Investigation of additional watersheds proceeds apace with preliminary examination or survey reports in process on some 65 watersheds. Stress is being laid on Mississippi tributary watersheds in accord with the President's desire that rapid progress be made on meeting the flood-control problem of that great basin.

The Department's watershed investigation job is being done by the Forest Service and the Soil Conservation Service in areas of assigned responsibility. Both Services participate in the installation of improvement measures on authorized watersheds in accordance with their respective functional specialties.

Watershed improvement measures are planned on a subwatershed basis, with local landowners and operators, soil conservation district governing bodies and, in some instances, State agencies participating with the Department in the planning. Actual installation of measures affecting individual farms is handled by the owners or operators with Department and other public assistance. Measures affording com-

munity benefits may be installed by the Department or as a cooperative endeavor with local and State governmental agencies.

Actual installation of watershed-protection measures under authorization of the flood control acts is just swinging into its second year on most of the 11 authorized watersheds. However, where soil conservation measures had been previously installed on a demonstration basis on minor subwatersheds within the area of heavy spring damage on the Missouri, the soil loss was much less and local floodwater and sedimentation damage was relatively light in comparison to that on nearby untreated subwatersheds.

Delay in protection of watersheds in aid of flood control will result in their further deterioration, in increased damages, in further loss of important productive values, and in increased costs of improvement and stabilization. The average annual flood and sediment damages have increased to at least $350,000,000 for the country as a whole. Prompt installation of needed measures will add strength to our Nation's agricultural production plant and reduce the annual damage toll by uncontrolled floodwaters and choking sediment.

TECHNOLOGY ON THE FARM

Surveys of American agricultural emphasize recent improvements which amount practically to a technical revolution. One measure of this progress is farm production for human use now as compared with what it was before the war. In 1946 this production was 33 percent greater than the average for the years 1935-39. About three-quarters of the increase resulted from technological developments; only one-fourth may be attributed to the exceptionally favorable weather of the wartime and early postwar years. Our farmers during the war years had actually less total cropland, including idle, fallow, and crop failure, than previously; but they reduced their acreage of idle and fallow land by 15 percent. In consequence the total acreage in crops was slightly greater than in the prewar years. But the farmers used no more man labor to get the above-noted production increase. With land in crops increased scarcely at all, and with no increase in man labor, it is evident that improved technology played a tremendous part in the production gain.

Main elements in the technological advance are well known; they include mechanical power and equipment, improved varieties of crops and livestock, and fertilizer and lime. Machinery facilitated the better timing of farm operations. Other cultural and management practices contributed significantly to the rising production totals, which reflected an advancing outturn per unit of both land and labor. Most of the technical improvements involved capital investments by the farmers. Particularly true of mechanical power and equipment, this applied also to some of the other items; for example, fertilizer and lime, used in many cases to build soils, improve farms, and return benefits over a period of years. Broadly, the technological developments substituted capital for labor; in other words, they increased the agricultural output per worker.

Some particulars deserve notice here. Farmers in 1946 used about twice as much fertilizer as they used before the war. As compared

with 1940, they had 65 percent more tractors; they had 180 percent more tractors than in 1930. In wheat harvesting they used combines on 80 percent of the acreage, as compared with 50 percent in 1938. The proportion of the oats crop harvested by combines was 40 percent in 1946, as compared with about 10 percent before the war. Mechanical corn pickers were 80 percent more numerous than in 1940 and in many parts of the Corn Belt accounted for two-thirds or more of the corn picking. Hybrid corn occupied more than two-thirds of the country's corn acreage—in the North Central States more than 90 percent. In 1933 the use of hybrid corn had just begun; corn growers found that it usually increases corn yields by about 20 percent. Farmers used tractor-mowers in 1946 to harvest about half the Nation's hay crop, as compared with only 15 percent in 1939. They had twice as many milking machines as in 1941.

Along with use of the machines and other aids above-mentioned, farmers experimented with numerous other new facilities. In some areas they mechanized cotton production to a considerable extent. Local studies indicate that mechanization of all cotton operations except picking reduces labor requirements by about 20 percent. Mechanical pickers were in use on some cotton farms. Complete mechanization of cotton production, which may soon be feasible, probably would reduce the man labor required to about one-fourth of what is necessary by methods commonly employed today. Farm mechanization is still relatively backward in the old South; the 1940 census reported the old South's investment in machinery per worker was only one-third the national average. In the West North Central States the corresponding investment was almost twice the national average. The advances in mechanization, in fertilizing and liming, in the use of improved crop varieties, and in other applications of technology, though conspicuous in the war years, had been long in the making. Wartime demands speeded developments which the depression years had held back.

Regional Aspects of Technical Progress

The South's lag in farm mechanization resulted partly from the fact that labor-saving machinery had not been perfected either for cotton or for tobacco. Cotton growing can be largely mechanized in some areas, but the machines available for that purpose do not yet rival those developed for planting, cultivating, and harvesting grain. Tobacco harvesting as yet is predominantly a hand-labor task. Lack of suitable machines for production with less hand labor accounts partly for the relatively smaller increase of production in the South during the war years than in other regions. For example, agricultural output for human use increased in the South by less than 25 percent, as compared with around 60 percent in the West North Central States. It should be noted, however, that by comparison with prewar years, weather conditions were more favorable in the West North Central than in the Southern States.

In the South the rural population has much less cropland per family than in other parts of the United States. Extreme density of farm

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population interferes with technological progress in agriculture, especially when people are crowded on farms that are too small for effective mechanization. The South's relatively great dependence on manpower rather than on machinery shows up in its high wage bill per farm. In 1940 this was 40 percent above that of the West North Central States. Possibly still more revealing was the fact that hired labor per farm in the South absorbed 30 percent of the cash farm income, as compared with only 13 percent in the other group of States. Briefly, the South must struggle in its technical battle against a combination of obstacles—such as lack of suitable machinery, high density in the rural population, and difficulties connected with the size of farms.

Agriculture's technological progress does not allow farmers to monopolize the benefits. They must share them with consumers, to some extent almost from the start and increasingly as the use of the better methods becomes general. How much the farmers themselves benefit depends partly on the size of their market, both as a whole and for individual products. Farmers who pioneer in technological progress always have an advantage. They gain when price and cost relationships are favorable and lose less than other farmers when these relationships are unfavorable; in other words, when the increased production that results from technical progress forces prices down severely. Even the most successful managers on farms, with great comparative advantages, cannot always avoid losses then. Nevertheless, the answer to that problem is not to abandon the improved methods, but to strengthen the market.

Technology as Crop-Adjustment Aid

Other parts of this report discuss the problem of the market, from the standpoint both of its roots in employment and from the standpoint of its relationship to agricultural prices. Here it suffices to mention a technological aspect of the market problem. It is a mistake to suppose that the march of agricultural technology must always add to the difficulty of adjusting the farm production pattern to the demand. Frequently, technical progress may lessen that difficulty; it may speed rather than delay the adjustment of farm operations to consumer needs.

For examples, farming systems in some major cash crop areas need more livestock, more feed crops, and more good pastures. Conversely, they need less emphasis on export crops whose future market is uncertain. To accomplish such changes does not call for any application of the brakes to farm technology, but on the contrary requires vigorous use of the most up-to-date methods, especially such as will reduce costs in the branches of production that need more emphasis.

Considerable investment may sometimes accompany technological developments of the kind mentioned, and farmers will naturally expect a return. This may come to them in several forms. Appropriate shifts in production, with a basis in good technology, will make the total farm output more profitable because better adjusted to consumer preferences. In addition, the improved technology will reduce costs of production and conserve or build up agricultural resources. In some

instances the necessary investment will facilitate an increase in the size of the farm business; the reward may be a considerable gain both in all-around production efficiency and in capacity to win and hold markets. Needless to say, public agencies can help agriculture to assimilate its constantly improving technology, especially through efforts to give farmers a balanced diet of technical information and through the development and proper coordination of national agricultural policy with the country's economic program as a whole.

FARM LAND VALUES RISE FURTHER

The farm-land market continued to reflect inflationary forces associated with further increases in prices of farm commodities and higher levels of farm income. For the sixth consecutive year, farm-land values rose at an average rate of 1 percent per month. The volume of sales was a record at a level slightly higher than that of the preceding year. Resales of farms after a limited period of ownership were about as numerous as in the previous year. Despite rising land prices and relatively easy credit conditions, the proportion of buyers paying all cash continued at more than one-half. Down payments in mortgage-financed transfers averaged just over two-fifths of the purchase price.

Average per acre values rose 12 percent for the country as a whole during the year ended March 1, 1947. This increase brought the United States index (1912–14=100) to 159 as compared with 142 on March 1, 1946. The largest increase occurred in the East South Central States; average values there rose 17 percent. In New England and in West South Central States values rose 9 and 10 percent, respectively. In the other geographic divisions value increases in the period mentioned ranged from 11 to 15 percent.

Average land values for the country as a whole continued to increase into the summer of 1947. Values advanced 2 percent from March to July. Sharp increases occurred in the wheat and range-livestock areas; these gains were more than enough to offset a slight decline in the Southeast. On July 1 the index for the United States was 162—10 percent above that of July 1, 1946, and 95 percent above the 1935–39 average. Average values for July 1, 1947, were only 5 percent below those of 1920, the peak year of the land boom that followed World War I. In 28 States the average values were equal to or above those reported in 1920.

The period 1942–47 brought a greater percentage increase in farm real estate values for the United States as a whole than any 5-year period in the last 36 years. There are no data for earlier periods. Between March 1942 and March 1947 values of farm real estate rose 75 percent compared with 65 percent from 1915 to 1920, the five consecutive years with the greatest value increase during the World War I period.

Voluntary sales during the 12 months ended last March were the highest of record though greater by only a small margin over the peak reached the previous year. Voluntary sales and exchanges of farms averaged almost 58 per 1,000 of all farms. In five geographic divisions the sales increased in volume while in four divisions they declined The increases were largest in the New England States. Sales in that

region were up approximately one-fourth from the previous year, though the ratio of sales to the total number of farms remained lower in New England than in most other geographic divisions. Declines were reported for the East South Central, South Atlantic, and East North Central groups of States. These areas experienced also a leveling off in land values. Proportionately to the number of farms the highest level of sales occurred in the Pacific States. About 7 percent of the farms there were transferred. The South Central, West North Central, and Mountain geographic divisions reported the sale of approximately 6 percent of all farms.

About one-seventh of all the sales reported during 1946 were resales of properties held 2 years or less. The resale rate was about the same as that of each of the last 3 years. One-third of all resales involved land held less than 6 months; three-fourths involved land held less than 1 year. Short period resales increased during the last half of 1946.

Farmers bought about two-thirds of the tracts sold, about the same proportion as during the three preceding years. Only about one-fourth of the nonfarmer buyers lived in the county where the land was situated or in an adjoining county. Some two-fifths of the nonfarmer buyers said they intended to operate the farms purchased. Owner-operators increased in importance as sellers during each year since 1941; sales by estates and corporations decreased steadily.

Despite the high proportion of all cash sales and the fair size of down payments in mortgage-financed transactions, many farmers incurred heavy debts. One-third of the sales during 1946 were mortgaged for 50 percent or more of the purchase price, or for approximately the full prewar market values.

Sources of Credit for Land Buying

Commercial banks and individuals increased in relative importance as sources of credit, while insurance companies and the Federal lending agencies decreased. Commercial banks and individuals made almost three-fourths of all the loans furnished to finance farm purchases. The proportion furnished by commercial banks more than doubled from 1941 to 1946.

This Department and the State agricultural agencies continued to inform the public about the farm land market. Educational programs acquainted prospective buyers with the danger of buying land on credit at inflated prices, and called attention to the fact that long-term earning capacity provides the only sound basis for purchases and loans. In June 1947 at the invitation of this Department farm-organization leaders, Government officials, and representatives of banks and insurance companies and other private lending institutions attended a conference on farm land prices and agreed that every effort should be made to discourage borrowing to speculate in farm land or borrowing to buy land at prices not justified by income prospects.

Loans should be based on the normal earning capacity of farms over a long period of years. The conference noted particularly, the rapid rise that has occurred in the prices of the poorer lands, and in the prices of lands that are hazardous for crop and grazing uses. It

reminded prospective land buyers that favorable weather conditions, such as have prevailed in recent years in normally rather dry areas, cannot be expected to continue indefinitely.

Whether farm land prices have reached their peak or will advance further is uncertain. Students agree, however, that the current high valuations may not prevail under long-run economic conditions.

SECURITY OF FARM TENURE

Security of tenure on family farms is one of our national objectives. It takes form in Federal and State legislation, and in the pronouncements of national leaders and representative groups of citizens. This Department in cooperation with land-grant colleges conducts research in land tenure and works with farmers and farm organizations to outline a desirable tenure policy.

Up to about 1900 the main element of our national land policy was the rapid settlement and development of all land resources on an owner-operated family-farm pattern. Exceptions to the policy of family-type farms developed in the plantation areas of the South, in the western Spanish and Mexican land grants, and in the Rocky Mountain area. In 1891 Congress forbade sale of land from the public domain, although it still permitted homesteading. By this time the Nation had started to drain swamps and irrigate arid lands. Land-tenure problems were not a subject of major concern; but the Nation was beginning to feel the pressure of a declining ratio of land to people. This feeling led to passage of the Reclamation Act of 1902 and the Weeks and Clark-McNary Acts for public purchase and development of forest lands. Between 1900 and 1926, however, rapid industrialization drew much population from our farms and relieved the pressure on land.

The depression years of the 1930's forced renewed consideration of land problems. Food and fiber surpluses existed; simultaneously, unemployment caused increased land crowding. Other land problems demanded attention, namely tax delinquency, farm foreclosures, and the misuse of land. The Congress authorized programs for crop adjustment; for soil, forest, and water conservation; for the promotion of farm-home ownership; for expanded credit services; for farm-mortgage moratoria; for homestead tax exemptions; and for the purchase of submarginal land by public agencies. Grazing associations and soil conservation districts facilitated local group action to improve land use, and local governmental units received power to zone rural lands.

Goals of Land Policy

Nevertheless, many land problems remain. Sound land policies must assure adequate supplies of agricultural products for domestic use and export at minimum costs consistent with American standards of living, and at the same time should provide for the best possible utilization and conservation of land. They should also conserve labor resources and promote the welfare of farm people. This combination of human with material values emphasizes standards of living for the farmer, for his family, and for farm workers that will be comparable

to those of other occupational groups. It includes proper security for farmers in their possession of land.

Farmers came through World War II in a favorable tenure position, with less than one-third of the Nation's farms tenant-operated. This is the smallest percentage since 1890. Needless to say, the improvement in conditions is the result largely of increased farm income plus greater earnings from off-farm employment. Some tenants became owners; and some holders of inadequate units acquired adequate ones. But this was not a main cause of the betterment. Primarily it came from the fact that many tenants and operators of poor farms abandoned farming.

The 1945 census shows that the public holds title to about one-fourth of all the land of the country. Most of this publicly held land, however, is in forests and grazing areas. Very little of it is suitable for arable agriculture. Our agricultural land, though on the whole widely distributed in ownership and operating units, shows extreme parcellation, and also extreme concentration, in various places. Very small farms (less than 10 acres) have increased 300,000 since 1920. But, simultaneously, big farms (1,000 acres and over), such as big western stock ranches and wheat farms, have nearly doubled in number and now account for 40 percent of all land in farms. About two-thirds of the farmers own all or part of the land they operate. Part owners make up about 17 percent of all owners and operate 11 percent of all farms. It should be noted, however, that much of the recent increase in ownership by farmers reflects the purchase of land at inflated prices, while some reflects the purchase of farms that are too small and unproductive to return an adequate living.

Principal Tenure Problems

Outstanding among our land-tenure problems are the following: (1) Too much crowding of farm families into some farming areas. (2) Too many full-time farm families on farms that are inadequate and that cannot be made adequate. (3) Some farm families on farms too large for optimum and sustained use of land, labor, or water resources. (4) Too many farm-tenant families with uncertain and often short farm tenure. (5) Antiquated land-leasing laws and customs which do not provide opportunity or incentive for long range well balanced farming systems. (6) Insufficient safeguards against land abuse and exploitation. (7) Penalizing of tenants who increase the productivity of rented farms in cases where the rent is increased as the farm is improved.

Much information relating to tenure already exists in usable form but new developments in technology, soil conservation, and general economic conditions create a need for continuing research in this field.

THE COMMODITY EXCHANGES

The competitive price quotations and hedging services of the commodity futures markets became more important in the fiscal year 1947, during which price controls and other wartime marketing measures

came to an end. Merchants, processors, and producers' organizations turned increasingly to the hedging facilities of the futures markets for protection against price risks.

Total volume of futures trading in regulated agricultural commodities increased 56 percent over the preceding fiscal year. Estimated dollar value of such trading amounted to 33.5 billion dollars, compared with 16.8 billion dollars the year before. Sharply rising prices and fast-moving markets attracted thousands of speculative accounts and the jump in futures trading taxed the facilities of the Commodity Exchange Authority, which exercises regulatory powers over the futures markets. A wide range of regulatory actions was required to avoid excessive speculation and price-manipulation, and guard against unlawful trading practices.

Demand for most commodities was heavier for immediate delivery than for distant months. This situation was reflected in the futures market by a continuation of "inverted" prices. Cash commodities and near futures sold at large premiums over distant futures; moreover, the spreads between futures tended to change rapidly. It was consequently difficult for many producers' organizations and others to hedge their risks effectively. The Commodity Exchange Authority afforded help and protection to hedgers and other traders in a number of ways authorized by Federal legislation.

For example, to safeguard the margin funds and equities of traders, the Commodity Exchange Authority made twice as many segregation audits of futures commission houses as in the previous year. Segregated funds exceeded $100,000,000, as compared with about $59,000,000 before the war. Also, the Authority conducted market-wide surveys of the futures positions of all traders in the principal markets for four major commodities—cotton, wheat, corn, and eggs. These surveys determined the ownership, the size, and the speculative or hedging character of more than 15,000 individual accounts.

In late 1946, after the October crash in cotton prices, the Authority investigated the causes; it found that heavy speculation, based in many instances on thin margins, had preceded the collapse. Guided by this information, the administration took three steps to further safeguard the cotton markets: (1) It reduced the permissible amount of speculative holdings by large traders; (2) it began publishing current data on the cotton futures holdings of the large-trader group; and (3) since the existing Commodity Exchange Act does not provide for the regulation of margin requirements, it drew attention to the fact that thin margins on speculative transactions constitute a standing threat to the stability of futures markets.

Speculation in Wheat

Early in 1947 unusual speculative activity developed in the wheat futures market, in which prices were advancing. In March the Commodity Exchange Authority recommended that the exchanges substantially increase margin requirements on speculative trades in grains. The increases adopted by the exchanges lessened for a time the danger of a price spiral and collapse, but the effect was largely

nullified in May, when the exchanges again sharply reduced their rates.

In May and June, when corn crop prospects declined and prices advanced, a large speculative interest developed in the corn futures market. A special survey showed that the bulk of all transactions in the market was speculative. Speculative trading in wheat also increased markedly in the summer. A request of September 15 by the CEA for an increase in initial speculative margins on grain trades to 33⅓ percent was not adopted by the exchanges. After a conference with the Secretary, the exchanges adopted a minor increase which he considered inadequate. On October 5, the President instructed the Commodity Exchange Commission, consisting of the Secretary of Agriculture, the Secretary of Commerce and the Attorney General, to demand adoption of the increase to 33⅓ percent. The exchanges complied the next day. There was an immediate and sharp decline in the volume of speculative trading in wheat and corn.

For the most part, the futures markets during the year came back to approximately their prewar position. Trading in a few commodities had not been resumed at the end of the year, or was still in restricted volume, but active trading was in progress on most of the 35 futures markets operated by exchanges licensed under the act.

RESEARCH AND MARKETING ACT

Program development took place under the Research and Marketing Act of 1946 in the first year after the passage of this important supplement to Federal legislation for "research into basic laws and principles relating to agriculture." Funds for actual operations were not immediately available, because the Congress adjourned shortly after it had passed the measure without a dissenting vote. Funds are available for the fiscal year 1948 and will advance a program that has passed already through planning, consultation, and drafting stages. The act broadens methods and objectives and provides for expanded and more closely coordinated Federal and State research. It also provides for broader teamwork between public agencies and agricultural, industrial, and commercial groups. Hence an account of what the act envisages, along with some facts about the program development, must form a part of this report.

Special emphasis rests in the act on the coordination and development of research to find new and wider uses for farm products and to improve and facilitate agricultural marketing. Search for new and extended uses for agricultural products likely to be in surplus demands special attention—products such as potatoes, citrus fruit, nonfat dry-milk solids, and other items for which the market may not indefinitely absorb production at the current level. In addition the legislation embraces marketing services, market-development work, and improvement of marketing methods and facilities. Also, the act authorizes expanded production research. In all these types of work Federal and State agencies will cooperate or will complement one another.

The development of a program began with conferences and consultations among Federal and State agencies and various nonofficial

groups. In October 1946, the Secretary of Agriculture appointed a National Advisory Committee, which held its first meeting on December 4. An interim committee representing the directors of the State agricultural experiment stations simultaneously took the first steps in regional program-planning. This committee recommended fields of work and conferred with experiment station people at regional and interregional meetings. Subsequently, upon recommendation of the committee, the Secretary appointed various commodity committees and also a transportation committee. Executive secretaries appointed by this Department worked with the committees. Aided by Department specialists, the committees summarized research problems and suggested research and service projects. State departments of agriculture and State agricultural experiment station representatives were likewise appointed to assist the working groups.

Committee work produced specific program recommendations with suggested priorities. Reports went to the National Advisory Committee, to officials of this Department, to State agencies, and to agricultural and industrial groups. They were available also to the public. The upshot was a program for the fiscal year 1948 which came within the limits of the expected appropriation, and which the National Advisory Committee approved with revisions at a meeting in July 1947. It became the basis for individual projects and for the allotment of funds.

Projects in Program-Emphasis

In line with the law's directions the program emphasized crop-utilization research, especially for commodities likely to be in surplus, and provided in many cases for laboratory and pilot-plant investigations. In addition the program provided for marketing research and service, including extensive cooperation between the Department and State agencies. Specialists long ago called attention to lagging physical improvement in assembly and terminal markets and in storage and transportation equipment. Under the Research and Marketing Act it will be possible to study requirements and make recommendations for many distribution centers. Expanded research may be undertaken into marketing costs, consumer preferences, the processing, conditioning, and packaging of commodities, and the problem of waste and deterioration.

Three main principles governed the choice of projects. It was decided (1) that projects selected should represent either new lines of activity within their field or lines in particular need of expansion; (2) that an effective balance should be sought between work for short-run benefits and work of a more fundamental kind; and (3) that the effort as a whole should center in a limited number of fields rather than scatter over many. The program earmarked substantial sums for Federal-State cooperation in marketing research and marketing service projects, and provided for exploration of opportunities for the contracting of work with private agencies.

A number of steps have been taken to improve the coordination of research and of marketing within this Department as a means of facilitating the general purposes of the Research and Marketing Act. Responsibilities of the Agricultural Research Administrator have been

extended to cover natural-science research in all agencies. The Chief of the Office of Experiment Stations has been made an assistant administrator of the Agricultural Research Administration. Within the Production and Marketing Administration a separate assistant administrator for marketing has been provided for, with a new marketing research branch of PMA reporting to him. An administrator of the Research and Marketing Act supervises the entire program under the act and will also have responsibility for coordination of all work in the Department relating to marketing.

MARKETING FACILITIES

In recent years the expense to the Nation for marketing farm food products has amounted to nearly 50 percent of their retail value. In the period 1935–39 it accounted for 60 percent. To increase the farmer's share of the consumer's dollar will take much effort. Many of the specialized processing and marketing services that are performed reflect the commercialization of our economy, the specialization of production by regions, and the increasing separation in time and space between producer and consumer.

In primitive societies the farmer's share in the final unit value of his product is much greater even though his total net return is less. Produced chiefly for home consumption or marketed directly in small quantities to neighbors, the output of the primitive economy receives little intermediate handling. But the primitive economy has a low over-all productivity, and low standards of living. We cannot copy it today. Our aim must be the very different one of keeping the advantages of modern distribution, which makes possible specialized production, and at the same time of holding down the per unit cost with relation to services rendered.

Marketing services are highly inflexible. Wage rates and other important charges seldom decline except in depressions. There is no gain to the farmers then, because farm prices decline too. In the conditions that have prevailed recently, with both the cost and the demand for marketing services tending to increase, it is difficult even to keep the farmer's share of the consumer's dollar from falling.

The first requirement is an expanding market. An increase in consumer incomes raises the volume and also the unit value of the farm products consumed. Without a high and stable level of general economic activity and employment, the farmers cannot expect more of the consumers' dollar. Nutritional deficits still exist even in the United States, not to mention other countries. But such deficits represent an opportunity for agriculture only if the hungry people have earning power. Needless to say, that is a perennial problem.

Moreover, the task of expanding the farmer's market encounters another difficulty. The demand for many agricultural commodities in some countries, especially advanced ones such as the United States, may not expand as much as the demand for nonagricultural products and services. Hence the existence of fairly high consumer incomes in a few countries does not offset the lack of food-buying power on a world basis. Poverty abroad may limit the American farmer's market beyond any possibility of getting a compensating market at home.

But the task of aiding producers and consumers through improvements in marketing and distribution is not hopeless, though it is huge. Dealing with it calls for a coordinated attack, with large resources, along a broad front. Some possible approaches may be mentioned. There is room for increased efficiency in the processing, transporting, and handling of farm commodities. Wages account for nearly half the cost of marketing farm food products. Ours is a high-wage economy; we want high labor incomes to provide large markets for agricultural and other products. This however, does not prevent a reduction in labor costs. It is possible to reduce such costs by eliminating unnecessary operations, and by mechanizing operations now performed by hand. Better labor-management relations, better general education, and increased training can improve the over-all productivity of labor. Self-service retailing, prepackaging, the use of frozen foods, mechanical refrigeration of railroad cars and of trucks, and the reorganization of wholesale markets provide other opportunities for reducing the spread between farm and city prices.

More can be done to reduce waste and spoilage, to improve the quality of products when they reach the retail level, to improve the form in which they are marketed, and to improve the distribution services. Research and education directed toward both producers and consumers can help. Farmers need facts as to the products that consumers desire, and conversely as to the kinds, types, and varieties for which the market is declining. Consumers need information that will help them to achieve more adequate and better balanced consumption.

New Market Outlets

We may be overloking possibilities for the development of new market outlets. Some of our people lack sufficient income to purchase necessary food and clothing. To let them remain impoverished to that extent is bad national economy. In emergencies special pricing arrangements may help to overcome this situation. Some opportunities exist for increasing the industrial use of certain farm products, in competition with products of nonagricultural origin. Further development of export markets is important, if necessary through surplus disposal operations outside the regular channels of trade. Marketing agreements and other measures for orderly marketing may facilitate distribution, especially if designed to promote a more even flow of commodities through the marketing system and a better integration of various stages in the marketing process.

Technological and organizational changes may bring about economies in distribution, with corresponding reductions in marketing margins and charges. In an equitable proportion these gains should pass forward to consumers in the form of lower prices, and backward to producers in the form of higher returns. This presupposes a high degree of competition in the marketing system. Monopoly at a few points in the buying, processing, transporting, or selling of farm products, especially if legislation interposes uneconomic barriers to trade, results in price situations out of line with demand and supply

conditions. Briefly it is important, when expanding markets and reducing marketing costs, to see that the benefits go to producers and consumers generally, rather than unfairly to small groups.

An adequate program requires: (1) Research to locate weaknesses and determine desirable changes, and to find out how they can be made; (2) translation of the research results into action; and (3) enforcement of fair play. With the resources available, the Department is conducting considerable work along these lines, with research, service, and regulatory action interlinked.

Marketing Services of USDA

The oldest of the Department's services to facilitate marketing is its market news service. This provides supply and price information on fruits, vegetables, poultry, eggs, dairy products, livestock, meats, wool, grain, hay, feed, seed, tobacco, cotton, and cottonseed in many of the important producing areas and terminal markets. In addition the Department collects and disseminates statistics on prices, production, and consumption, and reports the spread between the prices by farmers and those paid by consumers.

To acquaint farmers and middlemen with changes in economic conditions, the Department analyses prices, production, and consumption, and publishes the results. This work covers conditions in the United States; it also indicates foreign demand and shows the prevailing foreign competition with United States products. Grades and standards have been established for nearly all agricultural commodities, and are constantly being improved and revised. So that interested farmers and others may know products are being properly classed according to these grades, the Department in cooperation with the States maintains an inspection service for most commodities. Also the Department is working to develop plans for adequate assembly and terminal market facilities, proper storage, better transportation, better use of marketing facilities, and better operating methods generally.

Because transportation costs more than any other single marketing function, the Department studies transportation problems and situations. Before regulatory bodies it offers evidence and seeks to obtain low and equitable rates and flexible transportation. Occasionally it takes action toward the same objectives in the courts.

The Department is working to develop improved devices for use in processing and marketing, such as an automatic sampler for cotton, a coring device for wool, testing methods for quick determination of the spinning quality of cotton and the baking quality of wheat, methods of measuring farm timber, a better refrigerant than ice for refrigerator cars, and methods of measuring the gluten content of wheat. It administers a number of regulatory laws, such as the Produce Agency Act, the Standard Container Act, the United States Warehouse Act, the Federal Seed Law, the Packers and Stockyards Act, the Naval Stores Act, the Insecticide Act, the Commodity Exchange Act, the 28-hour Law, and the Meat Inspection Act.

Opportunities for Improvement

Naturally, opportunities exist for improving the Department's program. For example, the program is spotted in its coverage. Current activities deal only with parts of the distribution problem. On some commodities the market news service is good; on others very inadequate. Much remains to be learned about the costs of various steps in the marketing process. Standards for describing commodities are good. Grade factors do not always adequately reflect consumer preferences. Studies of market facilities, transportation, storage, and handling equipment are very limited. Some of the market regulatory laws are inadequate, and others are perhaps needed.

The handling of frozen foods, the potentialities of air transportation of farm products, the protection of perishable products, and the improvement of transportation and storage methods are a few among many subjects that would repay study. We need to ascertain the effect of various regulations on the cost and scope of distribution. Another important problem concerns the cost and efficiency of marketing operations as influenced by the size and organization of business units. We do not know enough about the efficiency of pricing mechanism, about methods of wholesale and retail merchandising as factors in marketing costs, about the possibility of developing new uses for farm products and byproducts. An urgent problem is how the distributive trades might increase the movement of large quantities during the seasons of peak production.

Complexity of Marketing Problem

Marketing problems tie in with price-support policies and programs. Marketing practices that increase the prices which producers receive and increase the volume of the production distributed will lessen the need for price supports. On the other hand, price supports should avoid undesirable interference with normal channels of distribution and consumption, and should discourage the production of commodities not wanted. The coordination is complex and very important. It is necessary also to know the relationship between the domestic market for food and clothing, which provides by far the most important outlet for the products of American farms, and the other outlets such as foreign trade and industrial utilization. Industrial outlets are of great importance to some products, notably cotton and naval stores; they represent significant marginal uses for many agricultural commodities. Foreign markets are extremely important to several major agricultural commodities. This three-way connection demands intensive study.

Programs with respect to rural electrification and rural industries have marketing aspects. Electrification programs may provide the power required for more economical nearby packing and processing. Processing in producing areas will offer reduced marketing costs and improve the quality of products. Rural industries provide agricultural markets and also alternative employment opportunities for farm labor.

Legislative Basis of Marketing Services

The Department has authority for research in marketing and distribution and for rendering marketing services. Some of the regulatory statutes, however, need revision because of changed conditions or experience gained. For instance, the Marketing Agreement Act should permit agreements and orders to restrict shipments that do not meet minimum standards of quality or maturity. It should allow orders to require commodity inspection, and should authorize the collection of assessments, even though prices may be above parity.

The Packers and Stockyards Act needs revision. The Standard Container Acts apply only to baskets and hampers for fresh fruits and vegetables. Wider coverage is desirable. The 28-hour law to regulate the transportation of livestock, not changed in 40 years, does not permit the issuance of regulation; it is out of date. Legislation may be needed to clean up and modernize the antiquated terminal markets for perishables that are now such bottlenecks in distribution.

FARM POPULATION OF THE UNITED STATES

During 1945, the farm population of the United States showed a net increase for the first year since 1932. The number of people living on farms was estimated as 25,990,000 in January 1946, which was 800,000 more than at the beginning of 1945. Over half of the net increase in the farm population was due to men returning to farms from the armed forces. They exceeded by 452,000 the number of men who left the farm population during the year to enter the armed forces. The remaining increase of 348,000 was due to the usual excess of births over deaths in the farm population. Migration of the civilian population away from farms was just equal to the migration to farms in 1945.

Civilian migration to farms balanced that from farms in a marked departure from the usual situation. In the 25 years from January 1920 to January 1945 the net loss from farms through migration (not including men entering or leaving the armed forces) averaged 600,000 a year. Even during the 1930–40 decade, when changes in the farm population resulted in a level approximately the same in 1940 as in 1930, there was an average net yearly migration of approximately 375,000. The balancing of civilian migration from farms in 1945 by migration to farms resulted from an increase of approximately 264,000 in the number moving to farms and a decrease of 212,000 in the number moving from farms as compared with the preceding year.

Farm population increased in every major geographic division of the country in 1945. The Pacific Division had the highest rate of increase, 7 percent, followed by the Mountain Division with a 5-percent increase. The higher rate of increase in these Western States may have been due in part to persons moving out to farms from the congested cities of the West Coast, and in part to some migration of discharged veterans and civilians from other parts of the country. A War Department survey made in the summer of 1944 of soldiers' intentions with respect to place of residence after the war had indi-

cated that the West would receive relatively more migrants than the rest of the country.

Five of the seven divisions outside of the West had increases of 3 or 4 percent in farm population during the year. The West North Central and the South Atlantic Divisions had increases of only 2 percent in both cases. The lack of much variation among divisions outside of the West in rate of increase in farm population during 1945 is due to the fact that the increase was mainly return of veterans, and that men from all States were discharged from the armed forces at fairly uniform rates.

Downward Farm Population Trend

As in all industrial countries, the long-time trend in the United States has been toward a decrease in the farm percentage of the population. In 1930 about one-quarter and in 1945 about one-fifth of the total population lived on farms. The rural nonfarm population in both 1930 and 1945 constituted about one-fifth of the population. With hard-surfaced roads, the greater use of automobiles and some tendency for urban population to move countryward, the decline in the rural nonfarm population has been checked. Rural communities constitute service centers for farm people. In them live many farm laborers and some farm operators.

Rural people contribute a large percentage to the future population. The number of children under 5 years per 1,000 women aged 30 to 34 years was 663 on farms in 1940 in contrast with 353 in urban centers. This differential birthrate, as noted elsewhere in this report, makes the health, education, and general outlook of the next generation dependent in large part on agricultural levels of living, and combined with other factors makes it important to provide nonfarm job opportunities, so that rural youth not required in agriculture may find an urban welcome.

Some migration from rural communities is desirable; it is not possible to provide nearby nonfarm jobs for all the excess agricultural manpower. But rural industries are necessary also. Such industries enable many to remain on farms and in rural communities who would otherwise have to go away. The rural population that obtains in nearby work, either part-time or full-time, will have a chance to increase its annual income and the Nation's total production. Combination of part-time industries with seasonal farming can be of considerable importance.

ACCIDENTS ON FARMS

In January 1947 the Department made a survey of farm accidents on about 15,000 farms in 814 counties. The survey showed that in the last quarter of 1946, 1 person was injured for every 28 farms included in the survey. Injuries varied from a mashed finger to a fatal burn. Gathered to represent the Nation, the survey figures gave more complete information on farm accidents than any previously available. The reported accidents included all injuries to persons living or working on the farms whether suffered on or off the farm. Assumed

as typical for the country, the survey figures imply that from October through December in 1946 persons living or working on United States farms suffered 210,000 accidents.

The costs involved for the Nation may be inferred roughly from the survey. Medical, dental, and hospital expenses to persons injured on the 15,000 farms surveyed averaged a little more than $40 per person injured during the last quarter of 1946. Applied to the Nation for the same period, this works out at $8,750,000 for medical, dental, and hospital expenses. Time lost from usual activities—work for adults and school or play for children—was about 4½ million days. In the survey counties only 11 percent of the injuries that involved medical, dental, and hospital expenses were covered by any insurance, and the coverage for these was only 15 percent of the total costs. Undoubtedly, the proportion of farm accidents covered by insurance was likewise small for the country as a whole.

About 8 percent of the injuries reported in the survey were in the Northeastern States. Ten percent were in the Western States, 38 percent in the North Central States, and nearly 44 percent in the Southern States. By regions the number of injuries was related closely to the number of people living or working on farms. In the highly mechanized North Central States, however, the rate was a little above the average.

Falls injured more farm people than any other type of accident; falls on stairs and steps or from vehicles were the most common. Falls on ice and falls involving home furnishings caused many serious injuries. Many falls resulted from carelessness and from faulty conditions in stairways, shops, alleyways, and barns. Machinery was involved in over 14 percent of the accidents; tractors in a third of that percentage. Corn pickers were second among the causes of injuries from machinery. Other frequently reported accidents caused by machinery involved combines, circular saws, mowing machines, corn shellers, and grain elevators. Farm animals, horses and mules especially, caused 12 percent of the accidents reported.

Nearly 60 percent of the people injured were adults between 25 and 64 years old. About four times as many boys and men between 14 and 64 were injured as there were women and girls. Of the youngsters under 14 who were injured, nearly 65 percent were boys.

About 56 percent of the accidents were the result of farm work. Only 8 percent occurred in connection with housework. Recreation and other activities accounted for the rest. About half the accidents occurred outside the home, but on the farm. One-quarter were in the home, and one-eighth were on the road or street.

RURAL HEALTH, EDUCATION, AND OTHER SERVICES

Health, education, housing, and other facilities and services for farm people are matters of national as well as agricultural concern. The Nation has a stake in the kind of facilities and services available to farm people. Birth rates are higher on farms than in cities; farm families raise a disproportionately large share of the Nation's children; and large numbers of young men and women migrate to nonfarm areas. Rural children must have adequate facilities and services;

otherwise, a considerable portion of the future population will grow up handicapped.

Farm families have done much to improve the rural community facilities and services provided. But they cannot achieve the kind of rural life they should have with only their own local resources. A farmer has no reason to expect his State or the Federal Government to help him obtain better medical care or better housing just because he is a farmer. But he has a right to ask for public services and facilities more nearly comparable with those enjoyed by nonfarm people.

The rural population in many areas suffers from deficiencies in medical and related services. Farm people generally do not have sufficient hospitals and they need more doctors, nurses, and dentists.

The Public Health Service of the Federal Security Agency has the chief Federal responsibility for health problems. The work of agricultural agencies frequently has a direct relation to rural health, especially its work in nutrition, the handling of rural water supply and rural sewage disposal, farm electrification which is a prerequisite for a modern water system and for good lighting and refrigeration, the control of disease-carrying insects, and the control of livestock diseases that affect man.

Health Departments in Rural Counties

The Social Security Act of 1935 provided Federal funds for the organization of health departments in over half of the Nation's rural counties. Hundreds of doctors and nurses and other personnel were trained in public-health work. This Department, through its educational program, aids the development of public-health units in rural counties. It cooperates with State Agricultural Extension Services, State Experiment Stations, and State health and welfare agencies. The Hospital Survey and Construction Act provides assistance for the States in surveying their hospital and health facilities and authorizes matching funds for construction. This Department, in cooperation with State agencies, draws the attention of rural groups to this act, and explains how it may be used.

Carefully planned State programs, with Federal grants-in-aid, could result in a more effective system of interrelated medical centers, district hospitals, rural hospitals, rural health and diagnostic centers, and mobile clinics and would encourage professional personnel to locate in rural communities. Other measures, such as training programs, fellowships and subsidies for rural practice, and the extension of reciprocity in State licensing, are also necessary. Such measures fall outside the work of this Department, but it may properly encourage them.

Educational Opportunities

In 1940 more than 57 million people, or 43 percent of the Nation's population, lived in rural areas (farm, rural nonfarm, and towns and villages under 2,500). Educational opportunities decrease as one goes from the cities to the towns, the villages, and the open country. Educational parity for rural people, all the way from elementary schools

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on up through secondary schools and colleges, is a desirable and yet far-distant goal. There is a great need for improvement of rural educational facilities—improvement of rural public schools, of college facilities for rural youth, of rural libraries, and of adult education in rural areas.

The rural areas have about 50 percent of the Nation's children between 5 and 19. These areas generally receive much less than half of the Nation's annual income. Generally, the local community provides the basic revenue for education. But the uneven distribution of the Nation's children in relation to taxable wealth creates a problem which shows up in many ways. For example, the tenure of rural teachers is short; they are less well trained than urban teachers; rural schools find it difficult to attract and hold qualified teachers. The average salary, in 1942, of the rural school teacher was $1,018, as compared with $2,013 for urban teachers. Moreover, rural school units are often too small for efficient modern operation. Many rural schoolhouses are still without electricity, which is essential for providing such facilities as good lighting and running water and for operating mechanical equipment such as a radio, motion-picture projector, and modern home economics and shop equipment. Rural youths should have better opportunities to get college education, with private scholarships augmented by public funds.

Approximately half of the boys and girls who grow up on farms move to cities to earn a living. With further mechanization of agriculture, more and more youth probably will seek employment outside of agriculture. Such youth needs training for a great variety of occupations. The expense, if the present system continues, will fall disproportionately on rural communities, and at the same time the training provided for the future urban residents will not be adequate.

Some 35 million people in the United States are without library service and 32 million of them are rural people. More than 600 counties have no public library facilities at all, while many rural communities lack funds to provide adequate books and competent librarians.

Rural Housing Problem

About 2 million farmhouses need major improvements and another 2 million should be replaced, a total of about two-thirds of the farm homes. A large percentage of the farm service buildings need replacement or repair. The recent improvement in farm incomes provides a basis for better rural housing. Estimates indicate that from 1939 to 1945 the number of farm families able to finance acceptable housing has more than doubled. Yet about 1½ million farm families still were unable to do so.

Low farm incomes in the past, chronically low in some areas, are largely responsible for this situation. Other factors include want of housing education, shortage of designs and materials especially suited to farm use, lack of adaptation of standard designs to individual farm needs, lack of low-cost electric power for lighting the farmstead and operating a water system and providing other modern housing conveniences customary to urban homes, lack of skilled labor in rural communities, inadequate credit, and the high cost of building mate-

rials. The problem of farm housing has emergency aspects, but it is primarily a chronic one.

Credit frequently is needed to finance improved houses and other buildings needed by farm owners, tenants, and laborers. Local banks and cooperative credit agencies of the Farm Credit Administration now provide credit where risks are relatively low. Many rural families, however, are not eligible for loans from these agencies. The Rural Electrification Administration was authorized by the REA Act of 1936 to make loans to its borrowers for financing of individual wiring and plumbing installations and for the purchase of electric farm and home equipment. The Farm Security Administration has made loans available to low-income farmers for the repair or replacement of housing and for other improvements. The Farmers Home Administration Act of 1946 authorized loans to low-income owners of undersized and underimproved farms for land, buildings, and other improvements. Special credit such as that proposed in title X of Senate 866, Eightieth Congress, National Housing Commission Act, should be very helpful.

Relation of Farms to Farm Housing

Large numbers of farm-operator and farm-laborer families live on farms which in their present condition will not support adequate housing. Many of these farms could be enlarged or improved so as to increase their earning capacity. Public assistance to this development would be for the general welfare.

Other Rural Requirements

Farm families face all the hazards that other families face—old age with earning power reduced or gone; accident, disability, and sickness that reduce income and bring high medical and other expenses; and early death of the main earners. Farming is one of the most hazardous of occupations. Farmers with at least a moderately good income can afford to pay for some insurance and to save to provide something for emergencies and old age. However, the insurance and savings of many of them are too low to provide for even minimum needs; and furthermore well over half of the farm operators, and an even larger portion of hired farm workers, have such low incomes that they make practically no provision for these risks.

At present most nonfarm persons except the self-employed and the workers in domestic service are eligible for the benefits of social-security programs. With the exception of "public assistance"—that is, assistance through Federal-State programs to the needy aged, the needy blind, and to dependent children—farm people do not participate in the benefits from social-security programs even though indirectly, and sometimes directly, they help pay for them.

Farm Radios and Telephones

Many farm homes are still without radio sets. This lack varies widely by regions. In the North, for instance, 92 percent of the farm

families recently reported owning radios, 83 percent with radios in working order. In the South 68 percent of the farm families had radios, but only 50 percent of the families had radios in working order. On the other hand, in the more thinly settled West, 94 percent of farm homes had radios, 91 percent with radios in working order. All over the country farm families without radios greatly desire them. In a recent survey economic reasons were most frequently given for not having them; lack of electric service or batteries came next. Large numbers of farm people—especially families in remote areas—do not now have access to dependable radio signals.

The 1945 census reported that 1,886,109 farms, or about 32 percent of all farms, had telephones at that time. Approximately 4 million farms were without such service. Incomplete industry data indicate that about 40 percent of the farms will have telephones as of January 1, 1947, and if predicted increases materialize, approximately 50 percent of the farms will have telephones by January 1, 1950. But even if the industry goal is attained, most of the farms still without telephones will be in areas where the proportion of farm telephones is small.

Bills have been introduced in Congress to amend the Rural Electrification Act to provide for rural telephones. This Department favors the general purpose. One such bill (S. 43, 80th Cong.) would provide for the financing by the Federal Government of facilities to furnish telephone service to persons in rural areas who are not receiving such service or to improve inadequate existing facilities.

Secondary Rural Roads

Farmers must often travel long distances in marketing products, purchasing supplies, delivering mail, transporting school children, and maintaining social ties. The rural road system, which includes all roads and highways outside the incorporated limits of towns and cities, amounted in 1941 to 3,004,000 miles. Primary roads represented about 332,000 miles; secondary and local roads made up the remaining 2,672,000 miles. The Federal Government during the 1930's contributed more heavily to the construction and maintenance of roads than it had previously. This additional aid resulted in considerable progress. Through grants-in-aid and other forms of assistance, rural communities should have an adequate system of all-weather roads, developed with an eye to the general improvement of rural living as well as to marketing requirements.

PHYSICAL FACILITIES OF UNITED STATES FARMS

Farms in the United States require much replacement of buildings and equipment; undoubtedly the replacement job will take several years. Nevertheless, supplies of the most essential items are more plentiful than they were during the war years. Compared with needs in war-torn and underdeveloped countries, those of the United States are moderate. This country is catching up with domestic requirements and meanwhile exporting some farm machinery and other farm equipment, as well as quantities of fertilizers, insecticides, and fungicides.

Output of farm machinery by American manufacturers was considerably greater in 1947 than in 1946—possibly as much as 40 percent greater. It enabled farmers to replace much of their old equipment. Farm incomes and farm savings were likewise high and manufacturers had no difficulty in disposing of their output. Surveys indicated at least 400,000 farm tractors, as well as many automobiles, trucks, combines, and other machines, would be exchanged for new ones as soon as possible.

Farm Requirements for Maintaining Productivity

Production for the calendar year seemed likely to run above 1 billion dollars in value, as compared with manufacturers' sales in 1946 of some $885,000,000, the record high up to then. Our own farmers took most of the production; nevertheless, exports were considerable, and for 1947 as a whole seemed likely to exceed those of 1946 perhaps by as much as 100 percent. Proportionately, on this basis, exports for the year would absorb nearly 15 percent of the production. In 1946 exports (of farm machinery and farm equipment) accounted for slightly less than 10 percent of the manufacturers' sales.

Some new farm-machinery plants came into operation during the year and others were under construction. Labor difficulties, which in 1946 were a serious handicap, had been adjusted. Shortages of certain raw materials, especially sheet steel, interfered with the production of some machines, though not to the same extent as in the war years and in 1946. With attachments, other equipment, and repair parts included, the total production for 1947 was expected to be at least 10 percent above the 1946 figure. Another 10-percent increase was in prospect for 1948. Stocks of farm machinery in the hands of dealers still were low, though moderately above the level of 1946. In a few lines, notably poultry and dairy farm equipment, the supply position was relatively good.

Farm mechanization in the United States showed up vividly in the use of tractors and tractor machines. These were at peak numbers. Between 1940 and 1947 the number of tractors on United States farms increased by about 1,200,000 up to a total of more than 2,700,000. In the same period numbers of horses and mules on farms declined by about 4,500,000. Many of the farmers' tractors were considerably over age in 1947, and farmers would probably junk at least 300,000 of their tractors if they could get replacements.

Undoubtedly the number of tractors on farms will continue to increase for some time. Along with the high feed prices and high wage rates of recent years there has been a lessened demand for horses and mules. Because prices of work animals were relatively low, colt crops have been small and the long downward trend in horse and mule numbers continues. Along with the increased mechanization there has been an increase in the average size of farms and a reduction in numbers of farms.

Fertilizers, Insecticides, Processing Equipment

Heavy use of fertilizer continues under the stimulus of good prices for agricultural products. More than 70 percent greater in 1946 than

in prewar years (1937–41), the use of fertilizers by United States farmers is an important factor in our continuing high production. In 1946 they used an estimated 650 thousand tons of nitrogen, 1,390 thousand tons of phosphoric acid, and 705 thousand tons of potash in commercially produced fertilizers. The supply available in 1947 was still larger, and a further increase is in prospect for 1948. Nitrogen for agriculture is coming now from plants that in the war years produced fertilizer only as a byproduct. More phosphate will come from increased production of phosphate rock and of sulfuric acid and from new acidulating plants. Meantime, however, the demand outruns the supply, particularly in areas that before the war made little use of commercial fertilizers.

Certain agricultural chemicals used as insecticides and fungicides are in short supply, and for the reduced quantity available the farmers this year may have to pay more than they paid for similar materials last year. Shortages continue in nicotine and dinitro compounds; in rotenone; and in naphthalene and paradichlorobenzene. On the other hand, the supply situation is favorable for pyrethrum, cryolite, sodium fluoride, sodium fluosilicate, copper chemicals sulfur, dust diluents, DDT, thiocyanates, organic fungicides, arsenicals, and fumigants.

In means of handling products after they leave the farm the situation is not quite so favorable. Shortages continue in some types of food processing equipment, the production of which has increased insufficiently owing to stoppages and lack of component parts. Tin containers are not yet plentiful, though more abundant than in 1946. Manufacturers expect, however, to be able to supply enough. Wooden containers are scarce; likewise burlap barrel covers. Rope is still a scarce item. Output has increased in many of these lines and undoubtedly will continue to increase, probably enough to relieve the shortage of food processing supplies materially within the comparatively near future.

Drain Upon Soils

High production on United States farms during and since the war emergency has involved some drain on agriculture's soil resources. It has obliged farmers to defer some programs for conservation, permanent crop rotations, and other means of improving their properties. They have maintained their interest in such activities, but have had to cope on the one hand with the exceptional demands of the market and on the other hand with shortages of labor and materials. As yet the demand has not declined for most crops and the task of adjusting war-expanded production to more normal levels is still in the future.

Chiefly the war interfered with the upkeep of the agricultural plant through the necessity it created for increasing the acreage of intertilled, soil-depleting crops. This seriously interrupted normal rotation practices. For example, in the Corn Belt and Lake States the acreage of intertilled crops increased by 9 million acres between 1941 and 1946. The increase, mostly in corn and soybeans, was largely brought about through shortening of rotations and reduction in the acreage of close-growing crops and idle and fallow land.

Plantings of wheat increased tremendously with a similar expense in terms of conservation practice. Acreage seeded to wheat jumped from 62 million in 1941 to almost 72 million in 1946, with the increase concentrated largely in Great Plains areas. Heavy plowing up of grassland occurred in the old Dust Bowl. The acreage of fallow land declined. These changes contributed to record food production, but they also affected soil fertility and organic-matter content and exposed a considerable area to accelerated soil erosion. In general, farmers in the Corn Belt and in the Great Plains followed soil-conservation practices as much as possible—far better than during and after World War I. By that means they boosted their output, as well as protected their soil. Yet considerable loss of soil and of soil fertility occurred.

The increase in livestock numbers in some areas of the Great Plains, if continued under less favorable moisture conditions could seriously reduce the carrying capacity of range land. In recent years moisture conditions in this area have been exceptionally favorable; but heretofore stretches of favorable years have been followed with stretches of dry years.

USE OF FERTILIZER AT NEW HIGH

Use of fertilizer reached a new high during the year. It would have gone still higher had larger supplies been available. Fertilizer helped farmers to maintain, restore, and improve their soil, as well as to increase their yields per acre. It was an important cumulative factor in rising productivity; and continued increased use of fertilizer along with the other up-to-date farm practices may be expected to accelerate the rise in farm production.

Mounting use of fertilizer is, of course, an effect as well as a cause of high farm production and earnings. Farmers must have income, or they cannot pay their fertilizer bills. Hence the influence of fertilizers on crop yields per acre is only one of the determining factors in fertilizer consumption. Equally or more important is the level of prices. In periods of falling prices the use of fertilizer usually declines, partly because farmers have less money then and partly because at lower crop prices expenditure for fertilizer involves greater risk. Farmers in this country last year spent a smaller proportion of their income for fertilizer than they did before the war. But, because incomes were higher, that smaller proportion bought double the prewar quantity of fertilizer.

On the assumption that farm prices or incomes will remain close to parity, it is probable the farmers will increase their use of fertilizer considerably in the next few years. Reports from the States give this indication for the country as a whole and for all its type-of-farming areas. Farmers want more fertilizer to build up depleted soil fertility and to establish conservation systems of farming, which require a vigorous growth of erosion-preventing and soil-conserving plants. The Midwest and Western States have the greatest possibilities. Heretofore reliant chiefly on natural plant food, these areas are now finding that after prolonged intensive cropping, their soil needs help. In areas on the other hand that historically have used large amounts of fertilizer the possibilities of increase though sub-

stantial are relatively smaller. Such areas have advanced already toward the point of diminishing returns, especially on crops with a high per acre value. Current shifts anticipate these indications. Consumption of fertilizer is increasing most in midwestern, western, and other areas where until recently the use was small.

These expectations of further increase in the use of fertilizer presuppose availability of supplies. On the scale of the indicated needs, that is a somewhat bold presupposition. Consumption of fertilizer in the United States in the crop year 1946–47 was double the prewar average, and a further gain would press heavily on production facilities, especially if supplemented as at present with some export demand. Our fertilizer production has a close relation to the world supply, particularly of nitrogenous plant food in which this country is on a net import basis. In many countries the supply of nitrogen fertilizer is below the prewar level. They are also short of food. The most economical way to increase their food supply is to assist them toward a greater use of fertilizer. Necessarily, however, this affects the fertilizer situation here.

Our Imports of Fertilizer

As indicated, the United States imports large quantities of fertilizer, especially nitrogen. Simultaneously it exports some of its own production to assist nations whose supplies are very short. In the year 1946–47 our exports of nitrogenous fertilizer were about one-third of our imports. The War Department reactivated Government ammonia plants and related plants and shipped a considerable tonnage of ammonium nitrate to occupied areas. It also shipped some phosphate rock to such areas. This country exported small quantities of soluble phosphates and potash during the year, largely to countries in the western hemisphere. The outlook for fertilizer use in the United States depends on supply prospects, as well as on indicated farm requirements.

The domestic commercial production of synthetic nitrogen has increased following the sale or long-term lease of five Government ammonia plants to private industry. In 1947–48 these plants will be in full production. In the fertilizer field they will turn out chiefly ammonium nitrate, ammonia, and nitrogen solutions. But the demand for solid nitrogenous materials, for direct application to agriculture, runs far ahead of the supply in all parts of the country. This is noticeably out of line with supplies in the Southern and Southeastern States and in the western part of the Corn Belt. In the last-named area the farmers have discovered recently that very high applications per acre return good results. Fulfillment of the needs requires further expansion of fertilizer-production facilities.

Capacity of Fertilizer Plant

Fertilizer manufacturers handled an increased tonnage during the war years with comparatively little expansion of their facilities. But now they must manage adequately to distribute 15,000,000 tons. So large a rate of annual distribution calls for a considerable expansion

of manufacturing and distributing facilities, particularly in the areas where the use of fertilizer has increased most. Specifically, this requires the building of new plants, the enlargement of old plants, the installation of new labor-saving machinery, and purchases of other equipment. Among the obstacles are shortages in all these lines. Somewhat overcome since the war ended, shortages of these items still prevent the fertilizer industry from producing and efficiently distributing the quantity of fertilizer materials that would be necessary to meet all requirements. Moreover, the industry must still cope with shortages of transportation equipment such as tank cars and boxcars.

Several bills have been introduced in Congress to alleviate the fertilizer situation. This Department has recognized an urgent need for fertilizer legislation. It has especially recommended legislation to establish a national fertilizer policy with the following main objectives: (1) Widespread adoption of conservation systems of farming partly through more adequate use of fertilizers and liming materials; (2) additional research and demonstrations in the use of fertilizer materials; (3) encouragement of the fertilizer industry to develop sufficient plant facilities to supply agriculture's needs at prices in keeping with its efficiency in both production and distribution; and (4) exploration, efficient utilization, and conservaton of fertilizer resources. The Department recommends the above-mentioned national fertilizer policy in the belief that it would steady and at the same time expand production and consumption of fertilizer materials.

ELECTRIC POWER IN RURAL COMMUNITY DEVELOPMENT

During fiscal 1947 rural electrification moved with greater speed, and electricity's impact on rural communities was felt with greater force than ever before.

More rural people received electric service during the year than in any previous 12-month period. The percentage of the Nation's farms electrified increased from slightly more than 50 percent to 61 percent. Power systems financed by the Rural Electrification Administration brought service to about 270,000 new consumers—the highest annual total in the history of the REA program.

Perhaps more significant than the year's record of rural electrification progress, however, is the glimpse of things to come that was afforded by 1947 developments. The increase in the number of electrified farms in the Nation and the parallel increase which is taking place in electrification of villages, schools, churches, stores, and other rural establishments foretell a dramatic change in the living and working habits of millions of Americans. This became apparent in 1947 to large numbers of rural people, who for the first time welcomed and recognized electricity as a working tool to help them achieve a healthier, more stable, and more satisfying life.

One symptom of this realization is the fact that more rural people sought electric service during the fiscal year 1947 than in any previous year in the Nation's history. Although the year's REA loans

amounted to $251,000,000—the second largest total in the agency's history—the backlog of unfilled applications increased from approximately $196,000,000 at the beginning of the year to about $278,000,000 when the year closed.

Although electricity adds immeasurably to the comfort of farm living, it becomes increasingly apparent with each passing year that the most solid contributions of electric power to rural welfare are economic. Dairying, poultry, and hog production, and other enterprises that promote soil conservation and farm diversification and that increase farm income are encouraged by the availability of low-cost electric power on the family size farm. The small farmer finds, for instance, that electrically powered grinders, driers, hoists, refrigeration devices, water systems, and other equipment help him to produce substantial quantities of high-quality livestock products without an increase in his labor supply or undue increase in his investment. He thus broadens his farm operation, improves his income and at the same time makes a significant contribution to the Nation's supply of animal products.

Electric power can also help improve farm incomes by powering the machinery that grades and processes farm products on or near the farm and thus increases their value to the producer. When this processing is done locally on a rather large scale, it produces rural industries such as creameries, elevators, mills, drying plants, rendering plants, and gins which provide part-time or seasonal employment for farm families. Thousands of such rural industries are on the lines of REA-financed cooperatives. Many new ones were added during 1947. Many are cooperatively owned by the farmer-producers themselves. Other sources of rural employment and income made more efficient by electricity are stores, garages, hatcheries, recreation areas, and many service industries.

Within the last year, increasing quantities of electrical appliances have been produced and purchased to lighten the household tasks of the farm homemaker and give her more time for less routine work and for leisure. Refrigeration and freezing by electrical means have increased the nutritive value of many farm products and improved the diets of thousands for farm families, as well as the value of products grown for market. In hundreds of rural communities, improved sanitation has been made possible by the installation of automatic water systems in farm homes and public places.

Running water, adequate lights, motion-picture projection facilities, and other modern improvements made possible by electricity increased the effectiveness of rural schools in many areas during 1947. They also made possible the use of the schools both night and day for adult training classes and demonstrations and for recreation.

Plans for the improved farm living that electrification helps bring about became reality for more and more rural communities in 1947. As the too-apparent gap between rural and urban opportunities narrowed, rural people—both young and old—were encouraged to look upon the farm community as providing an attractive and satisfying way of life.

Area Coverage Pattern Emerges

When REA was established in 1935, the cautious prediction was made that electric service might some day be brought to a million farms in addition to the 750,000 then served. In 1947, this modest goal had been surpassed by far, with more than 3,000,000 farms and many hundreds of thousands of nonfarm rural establishments receiving electric service. It has now become apparent that there are very few of the Nation's farms and nonfarm rural establishments that cannot be reached with electric power lines financed on a self-liquidating-loan basis.

About 2¼ million farms and perhaps as many nonfarm rural establishments still lack electric service. Extension of power lines to all of them is a formidable undertaking, since for the most part they are in sparsely settled sections of rural communities. For this task the rural electric cooperative, providing electric service at cost, has proved its value. During 1947, the pattern of Nation-wide "area coverage" rural electrification emerged from the activities of the more than 900 rural electric cooperatives financed by REA loans.

The year made it more apparent that the co-ops and other borrowers were no longer merely building lines but were building rural power systems. Many cooperatives, in their construction programs, concentrated on "filling in the gaps"—bringing service to consumers who had been missed in building previous extensions. Co-ops that were able to get the materials launched into areas where they had not previously gone at all. In some areas not previously served by REA-financed lines, new cooperatives were organized and new system were energized. The year also saw an increasing number of co-ops complete plans for extending service to all the potential consumers in the areas they serve. The effect of all these activities was to create plans for networks of lines that in some cases will blanket entire countries or parts of States.

The Power-Supply Problem

In planning these ultimate systems, REA borrowers take into account the ever greater use of electricity by rural families that is foreshadowed by the modern trend in rural life. There was a heavy demand throughout 1947 for REA loans to finance the construction of heavier lines and the addition of new transformers and other equipment that will enable REA-financed systems to handle the huge power loads now developing. This situation is the result not only of the connections of new consumers but also of the greatly increased use of power by individual farm consumers.

When REA was a new program, it was criticized for estimating that farm use of power might average as much as 100 kilowatt-hours per farm per month. Yet average use per farm on all REA-financed lines, having doubled since before the war, now exceeds 115 kilowatt-hours per month. Many co-ops are planning ultimate systems based on an expected average farm use of 200 to 300 kilowatt-hours per month. In many areas the demand for power in rural areas is taxing the capacity of production, transmission, and distribution facilities

with a consequent problem threatening to handicap rural electrification progress.

The power-supply situation is a challenge not only to REA, the REA co-ops and the various public power agencies but also to the commercial power companies, which serve more than half the country's rural power consumers and supply at wholesale more than half of the power distributed by the co-ops. Considerable progress was made in 1947 in planning new power plant construction, system interconnections and other measures to solve the problem. The provision of adequate power to meet the needs of rural areas remains, however, one of our most challenging national problems.

Finances and Requirements of REA Borrowers

REA borrowers maintained a strong financial position in 1947. At the end of the fiscal year, repayments of principal amounted to approximately $75,000,000, or more than 10 percent of the total loan funds advanced since the start of the program. Of this amount, almost $20,000,000 represented repayments ahead of schedule. Overdue payments amounted to less than 1 percent of the amount due.

Progress in assigning to individual consumers this growing co-op equity in REA-financed power systems was a significant development of 1947. Approximately 100 REA co-ops adopted the capital-credits plan, under which each consumer is credited with the contribution of capital in every year when co-op receipts exceed the cost of operation. These credits are set up on the co-op books in proportion to the consumer's patronage.

Many of REA's services to its borrowers during 1947 were concerned with the materials situation. The annual requirements of REA cooperatives alone for several items of materials, notably transformers, wire, and certain sizes and classes of poles, are now approximately equal to the Nation's total output of those items during an average prewar year. As a result, rural line construction crews were often slowed or halted by lack of materials, although before the year was out the growing volume of materials production enabled borrowers to connect a record number of consumers. There was also the threat throughout the year that sharp rises in materials prices might make line construction costs so high as to jeopardize area-wide electrification.

REA aided its borrowers in their attempts to overcome materials difficulties during 1947 by authorizing them to place contracts with suppliers in advance of actual allocation of funds for construction and to requisition funds to pay for materials well in advance of anticipated deliveries. This enabled the borrowers in many cases to have materials on hand even before construction bids were taken, so that they could be made available to a contractor well before construction actually got under way. Assurance of materials supplies enabled the contractor to contract for furnishing labor only and to give full attention to provision of an adequate labor force.

This procedure was an important factor in maintaining the speed of the construction program in many areas. It was also a factor in

keeping construction-bid costs down to a level that would not endanger the security of the REA loan.

In combating local power shortages, REA aided its borrowers in establishing present and ultimate power needs, seeking adequate supplies from all sources, and in some cases arranging for intersystem connections to provide new power sources.

The agency also aided its borrowers in establishing operating and financing procedures that would reduce costs and increase efficiency and in working out educational programs for consumers that would encourage efficient use of electricity.

In all its aid to borrowers, REA placed emphasis on aid to newly established systems and to others which required greatest aid because of financial or other problems. Less attention was given to the older and more firmly established borrowers.

ACHIEVEMENTS IN PLANT RESEARCH

Additional yield per acre has commonly been the factor first to come to mind as desirable in the improvement of crop varieties. In recent years disease resistance has become a factor of increasing importance. Its practical effect, however, is the same—more crop harvested per acre and per day of labor. With the growing complexity of agriculture, the number of factors in plant breeding has increased greatly. The increase reflects the need for special strains for many localities and soils and for various purposes.

An example is in the tomato-breeding work of the Bureau of Plant Industry, Soils, and Agricultural Engineering and the State experiment stations. Approximately 40 factors are actively sought for in this research. It is desirable to have many of them in one variety. Among them are high yield, earliness, fruit quality, fruit size, fruit depth, vitamin content, hybrid vigor; resistance to nematodes, fusarium wilt, early blight, late blight, and many other diseases; resistance to fruit cracking, leaf mold, drought, and defoliation; small core size, jointless peduncles (so stems will not stay on and gouge holes in other tomatoes), and extension of the growing season through various factors.

New crop varieties just announced by the Bureau show a wide variety of purposes and much success in producing plants adapted to various ends.

A new sugarcane variety, C. P. 36/13, bred by the Department and the Louisiana Agricultural Experiment Station and released for commercial culture in the fall of 1946, has resistance to the deterioration of its sugar while the cane is held in the field in windrows or otherwise stored for later milling. Some varieties lose a great deal of sugar under such conditions because a considerable quantity of the desired sucrose breaks down (is inverted) to what is known as invert sugar. C. P. 36/13 gives promise of wide use in the Sugar Bowl of Louisiana. It is well adapted to mechanical harvesting, is resistant to mosaic and red rot, and is a good yielder of sugar per ton of cane and per acre.

Valuable results in plant breeding, such as this variety, emphasize the importance of new genetic material, such as the varieties brought

in last year from Formosa, where the Japanese had concentrated them from various places in the East Indies. The Department obtained 155 new varieties of potentially valuable breeding stock and these are now growing in quarantine on the Island of Guam in preparation for possible use as breeding stock in continental United States, Hawaii, and Puerto Rico. They may possess characteristics that can be used to satisfy many requirements of growers and processors. There is promise through plant breeding of sweetening sugarcane still more.

Experimental breeding work may produce sorghums sweet enough to be a profitable source of commercial sugar. Sorghum has long been used for making sirup for local use in many parts of the country. Improved strains promise to extend the sugar-producing area and season. In 1945 and 1946 many crosses were made between the best domestic sorgos and breeding stock from India and Africa. Recently more than a thousand new varieties brought from Equatorial East Africa have increased opportunities for adding desirable characters here. In the past year the sugar plant specialists have developed polyploid forms of sorgo which should be useful in breeding high-yielding strains.

Sugar beet areas in the West where curly top disease is a factor will benefit from a new variety, U. S. 35, that is not only resistant to this destructive disease, but yields a high percentage of sugar. The variety U. S. 22, developed some years ago by the Department, is somewhat more resistant to the disease but is much lower in sugar. So U. S. 35 promises the farmer better returns for his efforts.

Plant breeders have made some unusual advances in adapting sugar-beet growing to mechanical harvesting. One advance is the creation of a variety for the Lake States area, called U. S. 215/216. It is highly resistant to leaf spot and enables each beet to grow and retain a strong full crown of leaves, a kind of "scalp lock" by which a certain type of mechanical harvester pulls the beets from the ground and transfers them to the topping knives.

Furthermore, the scientists report progress toward the breeding of strains of sugar beets producing single-germ seed balls, an indication of the probability of developing varieties that can be grown with practically no expense for hand thinning. Already some experimental lines have been grown with two-germ seed balls. Every sugar-beet seed ball of the varieties usable now produces a clump of plants that interfere with each other unless thinned.

New Varieties of Grains

Among the many new corn hybrids released during the past year by the Department of Agriculture and by different State experiment stations, several have unusual characteristics combined with capacity for heavy yield in particular areas. Developed jointly by the Department and the Kansas station is a yellow hybrid, K1639, that in its area compares well in yield with the famous U. S. 13, has lower ears that hold on to the stalk better, and a less leafy stalk, all factors favoring machine harvesting; and K1784, an improvement on U. S. 13 in being higher yielding and slightly later maturing, more resistant to lodging, and less susceptible to ear dropping.

Two new corn hybrids were developed for the South. Dixie 17, a white variety bred by the Department and the experiment stations of Tennessee, Mississippi, and North Carolina, is a superior yielder at all fertility levels and has good husk protection against pest attack. Dixie 11, also a white one, developed in cooperation with the Mississippi and Louisiana experiment stations, is especially suited to central Mississippi but is not sufficiently weevil resistant for use farther south. This is an indication of the extent to which hybrids are being adapted to limited localities.

Six new hybrid corn varieties, developed by the Department and the agricultural experiment stations of Indiana and Iowa, were released. One of the characters emphasized in the three Indiana varieties is resistance to stalk breakage when infestation with the European corn borer is heavy.

One of the new Iowa hybrids, Iowa 4308, has surpassed certification requirements with respect to yield, early maturity, and resistance to lodging. This variety was described in the northern section of the Iowa Corn Yield Test as surpassing the popular Iowa 931 by 3 bushels an acre, and having 2.8 percent less moisture in the grain at harvest (often a factor of high importance in avoiding soft-corn damage). In the test it had 7.7 percent fewer root-lodged plants and 7.6 percent fewer broken plants, and dropped 2.5 percent fewer ears. Low moisture at harvest and resistance to lodging have been developed to an important degree in some of the other hybrids produced at the Iowa station. In cooperative work with the Wisconsin station the Department observed progress in developing an inbred line with resistance to stalk rots.

Wheat varieties able to produce high yields of good-quality grain, under what would formerly have been unfavorable conditions, have given the world more food. An estimated 95 percent of the wheat acreage in the Northern Great Plains now grows eight new varieties developed by State and Federal geneticists. These varieties are high yielding, excellent in quality, and highly resistant to stem rust. Most of them were unknown or scarcely known 10 years ago.

One of the newest developments in wheat is a variety called Rescue, which has great resistance to the wheat-stem sawfly, a serious pest on two million acres in Montana and North Dakota. In Canada the problem became serious much earlier. Canadian plant breeders developed the resistant variety which has been introduced here. It has increased so rapidly that it will soon be available to all growers in the areas infested with the insect.

The most serious recent factor to oats raisers has been the destructive helminthosporium disease which attacks all varieties descending from the Victoria, introduced many years ago from South America. Fortunately, some of the newest and highest yielding varieties are resistant—Clinton, Benton, Eaton, Bonda, Mindo, Mohawk, and Bonham. Marion and the older varieties, grown previous to the distribution of the Victoria-related oats, are also resistant. Oats raisers consequently are well armed against this sudden enemy.

Mohawk, a new variety of oats developed by the Department and the Iowa and New York experiment stations, has been increased for distribution in New York. It is resistant to all the many races of crown

and stem rust now active or threatening in the United States, except race 45 of crown rust. Because of its short, stiff straw it is suitable for harvesting with the combine harvester. It is excellent for the dairy areas of New York; it will stand up well even where the fields are heavily fertilized with barnyard manure.

Bonham is a new oats variety for the Upper Peninsula of Michigan, developed by the Department and the Michigan and Iowa stations.

Gem, a new barley developed by the Department and the Idaho station is superior in many ways and has the interesting characteristic, because of semismooth awns, that it can be fed as hay without causing the cattle to have sore mouths. It is recommended as a feed barley, is a heavy yielder in nonirrigated regions, and should be adapted over a wide area.

Frontier, a new barley for irrigated lands, developed by Idaho, Wyoming, and the Department, and released to farmers of Wyoming, has shown yields 10 to 13 percent higher than other varieties.

Plant Improvements Many and Diverse

There is a new sorgo, Axtell, especially suited to a part of the area where this crop can be grown in Kansas and Nebraska. A new dwarf kafir developed by the Department and the Oklahoma station is suitable for combine harvesting in the eastern part of the grain-sorghum region. It has the unusual advantage of being easily harvested with a combine and having resistance to chinch bug. In the past most of those sorgos adapted to mechanical harvesting have been susceptible to this pest.

Minerva, a new variety of flax developed in cooperation with the Minnesota station and distributed last spring, seems well adapted in the North Central States. It has the double advantage of an unusually high oil content and oil of excellent drying quality.

There is a new cotton variety for California, Acala 4–42, developed at the Department's station at Shafter, Calif. During the past season 7,000 acres of it was grown for seed, enough to plant half the State's acreage in 1948. The plans for a rapid switch to this new variety are based on striking evidence of high spinning value in irrigation-grown cotton. At five irrigated stations in California, Arizona, New Mexico, and Texas in 1946 it produced yarn 10 percent stronger than the average of all the strains and varieties (including rain-grown) in the annual fiber and spinning studies. And it was more than 20 percent stronger than the currently grown California strain of Acala. It also grades 25 percent better in yarn appearance.

Strawberry breeders of the Department are emphasizing a new angle on values as a result of a survey of many varieties to find how they rank in vitamin C content. Fairpeake and an unnamed seedling, both bred at the Plant Industry station at Beltsville, Md., were found to have 2 to 2½ times as much of this vitamin as the lowest one, the variety Aberdeen. Most varieties and selections had 60 to 65 milligrams of this vitamin to 100 grams of fresh ripe berries.

Cloudy, wet weather kept down the vitamin C content, and berries from plants grown under shade had less of it than those grown with-

out shade. Berries picked half red built up their vitamin C content in ripening, but had less of it than those ripened on the plant.

There is a new onion, Calred, the first one resistant to downy mildew, a bad disease in some areas.

Peerless, a new high-quality lima bean, is of special interest to home gardeners and commercial freezers because of high productivity in hot weather, uniform maturity and good eating quality. It has shown up well under tests in many parts of the country.

A new midwinter lettuce, Imperial No. 17, developed for the Southwest, has the ability to grow at relatively low temperatures. An improved type of the well-known Wisconsin All Seasons cabbage is entirely resistant to yellows and mosaic; it is highly uniform, and has a white interior that suits the kraut maker. Marygold, a product of the National potato-breeding program, is especially suited to the Eastern Shore of Maryland and is readily responsive to treatment to break the rest period so that tubers of the first crop can be planted to grow the second crop that same summer.

Alfalfa in the East offers much difficulty to the plant breeders because this humid area is unfavorable for seed production. Such diseases as leaf hopper yellowing, leaf and stem diseases and crown and root rots are more severe here than in the dry West, where most alfalfa seed is grown. But cooperative work of the Department and a number of State experiment stations in the Eastern States is showing the posibility of developing varieties resistant to them. These varieties are crossed with others to adapt them to growing as feed in the East and also for seed production in the West.

To take the place of a crotolaria poisonous to livestock that has long been grown as a green-manure and cover crop, some nonpoisonous species have been tried out, and two of them, *intermedia* and *lanceolata*, have proved harmless and adapted to growing throughout the South. Like the poisonous one, which is called *spectabilis*, these new ones are also nematode resistant, so that farmers may use them in rotation with nematode-susceptible crops.

Chemical thinning of apples at blossom time seems promising on some varieties in the Pacific Northwest as a result of tests. Such methods when perfected will likely save much labor, improve the quality of fruit, and, in the case of some varieties at least, reduce the tendency that many apples have to bear only every other year. The use of 2,4–D (2,4–dichlorophenoxyacetic acid) to control harvest drop of certain extensively grown varieties of apples has shown great savings to growers.

Control of Weeds

2,4–D has been rechecked for weed control on sugarcane lands and found successful and does not, in these concentrations, have any harmful effect on cane or sugar yield. For weed control in bluegrass-seed fields it has been demonstrated to be important in increasing production. It is often so effective as to eliminate the expensive process of seed cleaning, which frequently is wasteful of good seed. A 2,4–D and fertilizer application, by a new method, in the fall, fertilizes the

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crop and kills most turf weeds at the same time. A mixture for this double purpose is already on the market.

Because 2,4–D kills a great variety of broad leaf crop plants and garden plants, as well as broad leaf weeds, the Department scientists advise extreme care to prevent damage to crops and gardens near treated fields. Studies by the weed specialists indicate that the greatest danger of injury is from airplane dusting, as the chemical is liable to drift for a considerable distance. Next to this is the ground dusting machine, and third is spraying it from an airplane. The Department recommends that any spraying with herbicides containing 2,4–D should be done when the air is quiet, because of this danger of drift.

With the increase in use of 2,4–D to kill weeds, the rate at which this chemical becomes inactive in the soil has become of much interest. Various factors have been found important in this, such as the amount of moisture in the soil, and the temperature. Moisture and heat increase the rate of destruction of the chemical. The addition of manure to a soil low in organic matter hastened inactivation of the chemical. Bacteria and other micro-organisms are now thought to play a part in the inactivation, since reducing their population by partial steam sterilization slowed down the process.

There is a new and promising method of killing quackgrass by treating the stolons, which grow along the surface of the soil, with IPC (isopropyl-N-phenyl carbamate) a chemical known for some time as destructive to small-grain plants. As little as 10 pounds per acre seems to be enough to kill quackgrass where it is growing in fields and smaller quantities killed it when applied to the soil where test plantings of the seed had been made.

Progress in Agricultural Engineering

Various engineering improvements were developed to the point of announcement during the last year. One of them was the development of spraying equipment that makes it possible to apply 2,4–D from an airplane to kill weeds in grain crops without using great quantities of water. The machine developed for this purpose uses a special nozzle and an inexpensive low-pressure turbine or gear-type pump instead of an expensive high-pressure reciprocating pump and can properly spread the needed quantity of the chemical with 10 gallons or less of water per acre.

A comparison of three methods of putting up forage (alfalfa-Ladino clover mixture) showed dry-matter losses from time of cutting to storage were 20 percent for field-cured hay, 11 percent for barn-finished hay, and 6 percent for that wilted and put in the silo. Studies of mechanical cotton harvesting show the water used on the fiber to facilitate picking can be reduced by half if a wetting agent is added. Tests have shown that in winter wheat production time of tillage is more important than the implements used, early preparation of soil after harvest (in Oklahoma) for the next crop resulting in much greater production than preparation half way between harvest and planting or just before planting. The development of cheaper chemicals for soil fumigation is making such treatment for nematode con-

trol a field-scale practice for some crops, including sugar beets, and in increasing such treatments in nurseries and greenhouses. Using cold night air to ventilate piles of sugar beets stored at factories is demonstrating that this is an effective way to prevent loss of sugar and to increase factory capacity by lengthening the operating season.

FARMERS HOME ADMINISTRATION

This agency provides a system of agricultural credit to farmers—including veterans experienced in farming—who are not able to get the credit they need anywhere else. It offers the family-type operator of limited resources, whose assets do not qualify him for the ordinary types of credit, an opportunity to get on his feet. Loans are supplemented by supervision where needed to assure successful farming and thus protect the Government's interest.

The Farmers Home Administration Act of 1946, approved August 14, made this program a permanent part of the Department's work and provided that it be carried on by a new agency created through a merger of functions of the Farm Security Administration and the Emergency Crop and Feed Loan Division of the Farm Credit Administration. The merger took place November 1.

Heavy demand from veterans marked the year's activities. There was a 55 percent increase both in the number of new operating loans to veterans and in veterans' farm purchase loans over the 1946 record of the Farm Security Administration. Forty-two percent of all money loaned went to former servicemen.

A total of 43,393 veterans borrowed. Of these, 35,134 received initial loans for livestock, equipment, and farm and home operating essentials; 4,874 borrowed a second time for such operating needs; 3,202 bought or enlarged farms or developed their land into economic family-type units; and 183 western veterans installed water facilities.

Among those assisted were 96 disabled veterans who borrowed to buy farms suited to their individual needs. The act permits veterans receiving disability pensions to borrow for farms which are not considered economic units. About 800 disabled veterans applied between November 1 and June 30.

There were indications that the demand from returned servicemen will continue to be strong. In many States it was necessary to stop making adjustment-type operating loans to nonveterans even before the spring planting season began, so as to make remaining funds available for eligible veterans. Yet nearly 11,000 veterans' applications for operating credit were carried over into the 1948 fiscal year. Veterans' applications for ownership loans which were held over numbered about 27,000.

Both veteran and nonveteran demand indicates that supervised credit for the small farmer—an idea first developed during the depression—is valuable in times of prosperity as well as in times of economic distress. A period of high farm prices and general prosperity gives the small operator a chance to work out changes that are essential for permanent success and to strengthen his position against possible depression later on. "Scratch starters" including veterans

and other young men who have some experience but no equity in land or chattels frequently need this kind of credit.

Services to farmers were not interrupted while the organizational changes required by the act were being made. On November 1, when the FSA and the crop and feed loan organization ceased to exist, borrowers' accounts were immediately transferred to the Farmers Home Administration and the lending and supervisory activities went on without delay.

During the next few months some of the county offices were moved or consolidated, regional offices were closed and their functions transferred to 40 reorganized State offices, and Washington staffs were combined, thus making it possible to carry on the program with about 14 percent fewer employees than before.

Types of Credit Provided

Credit provided is of three general types. Operating loans are made at 5 percent interest for the purchase of livestock, equipment, feed, seed and other essential items, and are repayable in from 1 to 5 years. Farm ownership loans are made at 3½ percent for farm purchase, enlargement or development, and repayments may be spread over 40 years. Veterans have preference. Water-facilities loans are made in the West at 3 percent for periods up to 20 years.

About 270,000 families actively participated in the operating loan program during the year. Those making basic adjustments in their farming developed farm and home plans, frequently with provision for such changes as reorganization of the farm unit, development of livestock enterprises, and adoption of crop rotations. Supervisors visited the farms to advise in carrying out the practices agreed on.

An example will show how supervised credit leads to better farming and higher income. Records kept by a Missouri borrower in 1943 showed his income from each dairy cow was about $3 less than the cost of feeding and housing it. The supervisor advised him, step by step, on a course of action to improve production. The farmer disposed of some of his old cows, bought good yearling heifers and bred them to purebred bulls. He added protein supplement to the feed, used more fertilizer on pasture and hay, and lengthened the pasture season by growing sweetclover. By 1945 his income per cow was $69 more than his costs, and by 1946 the profit had risen to $91 per cow.

The farm ownership program under the Bankhead-Jones Farm Tenant Act completed its tenth fiscal year with 47,000 loans made during the decade to tenants, share croppers and farm laborers, and to eligible veterans. The volume of lending in 1947 was the greatest since 1942: in addition to 3,202 veterans, 2,605 other farmers borrowed.

Flexible Allocation of Loan Funds

The Farmers Home Administration Act allows greater flexibility than existed previously in the allocation of real estate loan funds to States where the need is greatest and land is available at reasonable prices. It also established a new method of setting maximum loan

limits for individual counties. Since 1941 the program had been virtually shut out of many counties where loan limits were too low to permit a family to buy an adequate farm. These changes, and the heavy demand from veterans and others, were the principal factors in the increase.

As in other years, loans were made only for farms available at prices in line with normal earning capacity values, and the top limit on any loan was $12,000. Hundreds of applications had to be rejected because the farms sought were overpriced, but many sellers lowered their asking prices to bring them into line with the agency's appraisals. In Oregon, for example, 43 farms were rejected because of high prices; in 10 other cases in the State farms were bought after asking prices were reduced.

There was a close relationship between volume of loans and degree of farm land inflation in different areas. Lending operations were practically suspended in such States as Illinois, Iowa, and Kentucky, where values are very high. On the other hand, the number of loans increased in such States as Texas, Minnesota, Wisconsin, the Dakotas, New York, and Pennsylvania, where land values have risen least.

The number of families that pay off their loans years ahead of time continued to increase; by the end of the fiscal year 7,598 families had paid in full from income. About 16 percent of the borrowers have reached the goal of debt-free ownership in a comparatively short time. As a group, the active borrowers have paid 56 percent more than the amounts due.

Funds had not been appropriated for the insured-mortgage program authorized by the act; it will begin in the 1948 fiscal year. The agency will insure 40-year loans by private lenders; such loans must have the same purposes as those financed by the agency's direct farm ownership loans. The amount borrowed can be up to 90 percent of the investment in the farm and necessary improvements. The policy will be to insure mortgages when private funds are available, rather than to make direct loans. Only when an applicant is unable to get an insured mortgage loan or lacks the funds to make the required down payment will a direct loan be made.

Water-Facilities Program

In the water-facilities program, under the Pope-Jones Act, the agency made 911 individual loans and 14 group loans last year in the 17 Western States, and gave borrowers engineering aid in putting in or reconditioning wells, ponds, windmills, tanks, and other facilities for farmstead and irrigation water. With more materials available to build or repair water systems serving several neighboring farms, the demand for group loans was heavier than since before the war.

The need for this kind of assistance in the West is illustrated by the case of the High Line Ditch Co., Carbon County, Mont. Because of deterioration of their canal, the nine member families have not been receiving enough water to utilize their land to best advantage. Last spring they obtained a $23,000 group loan to rebuild the ditch and install siphon, headgates, and flumes. This will give them enough

water to continue irrigated farming, bring in more land for hay, and raise additional cattle and sheep.

Except in the water program, the agency's work in the 1948 fiscal year will be curtailed because of smaller appropriations. Fewer new borrowers can be served with supervised operating credit, and the number of direct farm ownership loans will be considerably reduced. The mortgage-insurance program, however, will enable many prospective borrowers to start on the road to ownership. The number of full-time employees for 1948 is 38 percent below the 1947 minimum, and there are about 450 fewer county offices than in June.

ECONOMIC AND STATISTICAL INVESTIGATIONS

Modern agriculture requires considerable economic and statistical information. Facts about prices, production, stocks, and many other matters are necessary to farmers if they are to plan their operations effectively. Such information is equally necessary for the programs of the Department and of the Congress and it helps the activities of other agencies and organizations. The Bureau of Agricultural Economics is the Department's chief economic research and statistical agency. Each year this bureau publishes hundreds of reports and analyses of demand, supply, and prices, besides the results of various special studies.

A study recently completed by the bureau traces farm mechanization through the last century. The farm labor force decreased from 22 percent of the total population in 1820 to 7 percent in 1940; yet the farm output increased tremendously. In 1830, 1 farm worker produced enough for himself and about 3 others. In 1945, 1 worker turned out enough for himself and more than 13 others. Much of this increase took place after World War I. Each man-hour of labor in 1945 meant 44 percent more gross production than in 1917–21. Half the increase resulted from mechanization, with other technological developments such as increases in yields of crops and livestock primarily responsible for the other half.

Looking ahead, the bureau believes tractors will continue replacing horses and mules. This replacement will release more farm land for the production of food and fiber. More farmers will adopt machines already in use. The more recently developed machines, such as beet harvesters, sweet-corn pickers, pick-up balers, forage choppers and dairy-barn cleaners, will become numerous. Adoption of the mechanical cotton picker and other machines is in prospect. Complete rural electrical service seems assured. Timely information about such developments often favorably influences farmers individually and collectively in planning their farm programs. Studies by the BAE in farm management include analyses of changes in crop and livestock production as such changes affect income and expenses on different types of farms. These studies also deal with the classification of farms, and with the relative efficiency of family-operated, large-scale and part-time farms. They reveal trends of much practical importance, and also agricultural needs, such as for rural services, housing, and farm improvement.

The BAE is continuing its studies of marketing margins and costs for all major groups of farm products. One such study, released this year, concerned bakery and cereal products. Based on 1939, the last year for which censuses of manufactures and distribution were available, it showed that grain growers received only about 13 cents out of the consumer's dollar spent for bakery and cereal-grain products. Retailing took 18.9 cents; wholesaling, 10; processing, 52.3; transportation, 4.1; local assembly, 1.0; and terminal concentration, 0.7. Buttermilk, fruit, and other farm commodities also enter into bakery and cereal products and the farmers share for all farm products used in such products was 17 cents. Similar published studies showed what happens to the consumers' dollar spent for cotton products and for livestock and meat. This marketing research also analyzed processing and marketing of citrus fruits, methods of reducing loss in rail transportation of fruits and vegetables, and operations of wholesale produce markets at Cincinnati and San Antonio.

Land Values, Taxes, and Tenure Studies

Studies by BAE in land values and the farm-real-estate market provided charts and tables for the land value conference called by the President last summer. As reported more fully elsewhere in this report, the material showed that in March 1947, the average value per acre of farm real estate in the United States was 92 percent above 1935–39 and only 6 percent below the 1920 record, and that real-estate values in recent years had climbed faster than during the World War I period. Related studies showed that farm-real-estate taxes per acre had climbed since 1943. Such taxes in 1946 were up 12 percent per acre from 1945 and were the highest since 1931. Taxes per $100 of land value, however, were unchanged from 1945 when they were the lowest since the early 1920's. BAE studied other phases of the land problem, such as problems of farm ownership; changes in the number and proportion of farms; changes in the acreage operated by croppers, tenants, managers and part-time owners; developments in water utilization; and the operations and effects of organizations, such as soil conservation districts and crop-grazing districts. An important BAE study dealt with agriculture's balance sheet; it is noticed elsewhere in this report.

Effects of economic trends on the living of farm people and on the variations therein, and comparisons of rural living with that of towns and cities, form the subject matter of investigations by BAE scientists. One recently published study showed that the level of living of farm-operator families had improved about one-fourth since prewar years. Practically all counties in the United States showed improvement in this respect. Other investigations in the Bureau concerned farm population trends, the farm labor supply, and the activities of certain rural communities, especially activities related to the use of rural resources.

Special Studies and Periodic Reports

Two special studies recently by the Bureau approached long-time problems. One was a consumer-preference survey in textiles. De-

signed to get the opinions of women on important aspects of this problem, the study asked why consumers bought cotton or rayon, why they preferred one or the other for particular uses, and what qualities would make cotton dresses and cloth more attractive. The other long-range study concerned hog production and indicated that price is not always the determining factor in the number of hogs that a farmer will produce. If he has facilities established for the production of a certain number of hogs, he often will continue to produce that number, whether the price outlook is favorable or not.

Periodic reports issued by the Bureau are of great importance and fall in two groups: (1) Crop and livestock estimates, and (2) outlook and situation reports.

The BAE publishes annually several hundred estimates and forecasts of production, prices, and stocks for more than 100 crops and classes of livestock. Nearly three-quarters of a million volunteer reporters provide information for these reports. Sent through 41 field offices, the reports come to the Bureau's Crop Reporting Board in Washington for analysis. As finally published, the reports help farmers, merchants, millers, bankers, and others and provide the Government with information basic to the programs for production goals and price supports.

Outlook and situation reports for important crops or groups of crops and for major classes of livestock and livestock products analyze supplies, demand and prices, and appraise prospects. They give statistics of the current situation and research findings on important problems. Special outlook issues in the fall give farmers an over-all picture for the coming year. In this work the BAE cooperates with other Department Bureaus, with the Extension Service, and with the State agricultural colleges.

RESEARCH IN NUTRITION AND HOME ECONOMICS

Analysis of the nutritive value of the per capita food supply of the United States over a 37-year period, shows unmistakable improvement in food habits in this country, especially in the last decade. Completed recently by the Bureau of Human Nutrition and Home Economics, the analysis reveals that the average caloric value of the food supply varied little throughout the period. Protein content decreased gradually until during the recent war years. The per capita quantities of calcium, riboflavin, vitamin A, and ascorbic acid available for consumption showed a long-time improvement. Increases in calcium and riboflavin accompanied the rise in the per capita consumption of milk; increases in vitamin A and ascorbic acid were associated with the greater consumption of vegetables and citrus fruits.

The per capita quantities of thiamine and niacin available in the food supply showed gradual decreases to all-time lows in the middle thirties. The decline coincided with a decrease in the consumption of grain products, accented by reduced meat supplies in 1935. Some increase came later with an increase in the supply of pork. A sharp rise occurred in the early forties, as a result of bread and flour enrichment.

The nutritive value of the food supply from 1935 to 1945 rose from the low levels characteristic of a depression period to the high levels characteristic of full production and relatively high consumer purchasing power.

Nevertheless, even in 1945, some of the Nation's families had less of various nutrients than the average which the aggregate food supply would afford. How far below the average some families were is shown in studies made in two States in the summer of 1945.

In one of the low-income counties studied, half of the families had diets rated unsatisfactory. Their diets furnished less than two-thirds of the recommended allowances of the National Research Council for calories and for eight specified nutrients. Calcium, vitamin A, and ascorbic acid were comparatively low in many diets. Unsatisfactory diets were found in twice as many families of sharecroppers and farm laborers as in families of farm owners and renters. Most of the unsatisfactory diets on farms were those of families with net-money income below $1,500.

Average figures may obscure such situations. The average ascorbic acid content of the diets of the Negro farm families studied was 125 percent of the recommended allowance. Yet 43 percent of these families failed to get as much as the allowance, even in the summer months. In fact, in this sample of families, about twice the recommended allowance as a group average for a nutrient appeared necessary to insure that practically every family would be getting at least the allowance. When the average value for most nutrients was about 150 percent of the recommended allowance, almost every family diet contained at least ⅔ of the allowance.

It has been proposed that in planning the distribution of world food supplies a margin of 15 percent be allowed to cover maldistribution. These data on dietary levels of Negro families suggest that this might be insufficient. At the level of 115 percent of the average, 40 percent or more of the diets were unsatisfactory in the various dietary factors.

The deficient diets discussed were summer diets in a high-production year. More deficiencies would be expected in winter or late spring diets. One way to improve rural diets is to conserve seasonal abundances. This is an old problem, now more difficult than ever, because consumers demand high-quality food conserved with a minimal loss of palatability and nutritive value.

Studies are showing that vegetables canned in small containers require shorter processing time to assure keeping quality and safety from spoiling than when canned in large containers. This results in less overcooking and loss of nutritive value. The findings resulted from controlled experimental processing of some 4,000 tins and jars of non-acid foods.

Farm families who have freezers or have access to community lockers can make beneficial changes in their diets. Freezing of seasonal abundance, at the peak of its quality, will facilitate better food for out-of-season consumption by rural families. Studies of home freezers have suggested improved specifications for such equipment and indicated treatments needed to protect the initial quality of food.

Protection of Fabrics

Mildew damage costs the American public an estimated $100,000,000 a year. Three-fourths of the United States is affected. Mildew fungi flourish particularly where it is both humid and hot. Losses run especially high after floods and long rainy periods.

In seeking home methods of protecting cotton fabics against mildew, the Bureau of Human Nutrition and Home Economics developed practical chemical finishes for prolonging the useful life or household and farm goods, such as awnings, shower curtains, porch furniture, tents, and seedbed covers.

One achievement in the development of practical mildew-resistant finishes for which the Bureau was granted a public-service patent covers the use of morpholine with certain inorganic salts, especially those of cadmium and copper. The finishes are effective even after five washings and after 6 months of storage. On weathering, the morpholine with cadmium chloride application holds up well.

The Bureau has cooperated with the U. S. Forest Service to increase the durability of seedbed coverings by experimenting with 10 mildew-resistant finishes. Five of these have proved effective. In another study, cooperative with the Bureau of Plant Industry, Soils and Agricultural Engineering, effective treatments have been found for tobacco-bed covers.

Termites cause fabric damage under the same climatic conditions that favor mildew. Experiments made cooperatively with the Bureau of Entomology and Plant Quarantine developed finishes resistant to mildew and termites alike. The Bureau of Human Nutrition and Home Economics suggested the use of two natural dyes—quercitron and osage orange. Applied with copper sulfate and potassium dichromate, they proved valuable. Other effective finishes originated by the Bureau included combinations of 8-hydroxyquinoline with copper sulfate, mercuric chloride, and aluminium acetate. One finish, copper quinolinolate, is now produced commercially.

In much of the Bureau's early work on mildew, cotton fabric was tested by inoculating it with the cellulose-destroying organism, *Chaetomium globosum*. Practical applications showed need for a more severe test method. The Bureau therefore devised a soil-suspension method, which proved rapid and dependable. By this method and by indirect inoculation, the resistance to mildew of specially treated fabrics in outdoor use can be predicted.

Family Living Expenditures

The Bureau of Human Nutrition and Home Economics conducted a survey of farm-family living expenditures for the year 1945, in cooperation with the Bureau of Agricultural Economics. Approximately 1,800 farm operators in the North Central and in the Southern States were interviewed. The data obtained will permit comparisons of the consumption patterns of farm families by region and by type of farming area (corn, dairy, cotton, etc.), and in addition will show consumption patterns according to tenure and, the size of families and other family characteristics. Findings on regional expenditures

for house furnishings and equipment and housing repairs and improvements are now available. Comparisons with data obtained in 1941 show trends in expenditures.

Farm families in the North Central region made an average expenditure in 1945 of $79 for furnishings and equipment, as compared to $58 made by farm families in the Southern region. In both regions expenditures were greater than in 1941. However, farmers received less for their money, because prices paid for furniture and furnishings were 50 percent higher. Both regions spent more in 1945 on furniture and floor coverings than on any other group of items. In 1941 kitchen equipment was the biggest item. In 1945 the supply of kitchen equipment, such as refrigerators and stoves, was restricted.

Farm families made more house repairs and improvements in 1945 than in 1941, despite the scarcity of building materials, supplies, and labor. Families reporting such expenditures spent $136 on the average, as compared to $75 in 1941. In the North Central region in 1941 farm operators spent almost 50 percent more than those in the Southern region. By 1945 the average expenditure for house repairs or improvements had almost evened out—$138 as against $133. Over one-fourth of families surveyed made repairs in 1945 and almost one-tenth made improvements. In both regions painting was the most frequent type of repair. Plumbing installations were the most frequent type of improvement in the North Central States. Additions of rooms and porches ranked first in the Southern States. A marked increase occurred between 1941 and 1945 in the proportion of tenant operators in the North Central region who paid for repairs to their dwellings—31 percent in 1945, as compared with 18 percent in the earlier period.

Properties of Yarns and Fabrics

Interest in the best use of fiber has focused attention on the structure and properties of yarns and fabrics. The Bureau of Human Nutrition and Home Economics has studied the stress-strain properties of knitted fabrics—an engineering approach to the determination of the relative value in consumer use of different fibers and constructions. Less is known about knitted fabrics than about many other textile materials, though knitted fabrics are a potential source of greatly extended fiber utilization.

The amount of stretch and elastic recovery are among the factors which determine the suitability of a knitted fabric for a specific purpose. The research has revealed that the elastic recovery of fabrics cannot be predicted from that of their yarns. For example, nylon yarn is superior to wool in this property; yet nylon fabric knit of the same yarn does not recover as much as similar wool material. Made of the same yarn, a fabric loosely knit may be quite different in elastic recovery than if tightly knit. The elastic recovery of the nylon, silk, and filament viscose was considerably less with 40 courses per inch than with 64; the recovery of wool was greater with 40 courses per inch. Such fundamental research defies a brief description, but a few of the details may of interest.

For example, as regards tenacity, stiffness, toughness, resilience, and elasticity, the yarns for the most part ranked in the same order

as the fibers from which they were made. The nylon and silk yarns were considerably greater in tenacity than any of the others; spun acetate and wool the lowest. Linen was superior to the cotton and rayons. Of the cottons, the tenacity of combed yarns was greater than that of carded; that of mercerized greater than that of natural. The nylon, silk, wool, filament acetate, and filament viscose yarns elongated the most at rupture; the linen and cotton the least.

Fabrics knitted from the different yarns differed in toughness. Nylon and silk yarns and fabrics were toughest. Linen yarn had the lowest toughness; yet the linen fabric ranked higher than 6 others. Fabrics knit with 64 courses per inch were tougher than those knit with 40 courses per inch, except the natural combed cotton, which did not differ with the courses per inch.

SCIENCE AIDS LIVESTOCK PRODUCTION

In December 1946 the dreaded livestock plague, foot-and-mouth disease, appeared in Mexico. An established policy of this Department is to do everything possible to exclude this highly infectious disease from the United States by rigid quarantines. It is present in many countries.

The methods of eradication used by the Department and cooperating States include slaughter of infected and exposed animals; these methods have both a scientific and practical basis, and in the United States have met with broad popular support. The Department also cooperates, within the limits of its authority, with foreign countries in controlling outbreaks.

At the invitation of Mexican authorities, when the presence of foot-and-mouth disease was suspected, the Department sent veterinarians to Mexico to participate in diagnostic tests. These tests showed that foot-and-mouth disease was present; and actions taken included (1) stopping the entry of animals or products likely to carry the infection to the United States; (2) participation with Mexican authorities in inspections to determine the extent of the outbreak; and (3) consultations with veterinary, diplomatic, and legislative leaders in preparation for a joint campaign of eradication. The presence of the disease in Mexico was a threat to the 12-billion-dollar livestock industry of the United States.

Legislation enacted by the United States Congress, on February 28 and March 27, 1947, supported the campaign which began prompty though at first on a small scale under the direction of a Mexican-United States Commission. With some modifications to meet conditions peculiar to Mexico, the methods were essentially those previously used with success in the United States. The main features were diagnosis, quarantine, slaughter of infected and exposed animals, deep burial, cleaning and disinfection of premises, and final testing to insure the completeness of eradication.

Within a few months the United States sent veterinarians, sanitary technicians, livestock valuation experts, and other trained specialists to Mexico and also more than 130 carloads of equipment and supplies. It provided liberal financial assistance, chiefly for paying indemnities for cattle and a part of the operating expenses. In turn, the Mexican Government paid indemnities for swine, sheep, and goats. provided a

staff of about 200 veterinarians and other specialists, and assigned about 15,000 troops for guard duty and to enforce quarantine regulations.

Before the eradication personnel and equipment could be mobilized in sufficient strength, the disease had spread to parts of 16 States and the Federal District. At one time the infection approached to about 275 miles from the United States and to about 125 miles from Guatemala. Subsequent systematic large-scale operations, conducted from the outside toward the center of the infected areas, somewhat repelled the approach of the disease to both countries and by midsummer of 1947 reduced the number of infected States from 16 to 12. The campaign is continuing vigorously. Larger field forces and additional equipment are now being procured to hasten final eradication.

Inspection of Canned Animal Foods Established

Under the Research and Marketing Act of 1946, the Department established in November 1946 an inspection and certification service for canned wet animal foods intended for dogs, cats, foxes, and other meat-eating animals. This class of product, which is packed in moist condition, in contrast to dog biscuit and other dry foods, constitutes a large industry for which the establishment of uniform and dependable standards had become desirable.

The service, available to packers who request and pay for it, includes supervision of sanitary conditions at the plant, of the ingredients used, of labeling, and of various other operations.

Progress of Campaigns Against Tuberculosis and Brucellosis

In the campaign to eradicate tuberculosis from cattle more than 6,000,000 herds containing about 65,500,000 cattle were under supervision at the end of the fiscal year 1947. This disease, at the beginning of the campaign 30 years ago, affected about 5 percent of the cattle of the United States. It now affects 0.2 percent. In some areas of high infection it formerly affected 25 percent or more of the animals; the highest degree of infection in any region or State is now less than 0.5 percent. Most of the current work is retesting.

Records of Federal meat inspection show the effectiveness of the campaign. In 1917, when the campaign began, the carcasses of more than 46,000 cattle, exclusive of reactors to the tuberculin test, were condemned as unfit for human food because of tuberculous infection. Last year the corresponding number was less than 1,000. Besides this substantial economic saving was the related protection to human health.

The campaign to eradicate brucellosis, or Bang's disease, is making progress. In the fiscal year 1947, the percentages of infection as shown by blood tests was 4.5 as compared with 5.0 for the previous year. On June 30, 1947, approximately 2,250,000 herds containing more than 17,500,000 cattle were under official supervision for the eradication of brucellosis, and about 2,500,000 additional cattle were on the waiting list. At the same time 513 counties in 22 States had qualified as areas officially accredited because of their satisfactory

progress toward the eradication of the disease. In addition substantial protection to the health of herds is being provided by the extensive vaccination of calves and a vaccine developed by this Department. The demand for vaccination against brucellosis continues to grow. More than 890,000 calves were vaccinated last year—about 2,850,000 since calfhood vaccination was introduced in 1941.

Internal Parasites Chief Cause of Sheep Losses

Control of internal parasites in sheep is a prerequisite to successful sheep breeding and feeding. Infested sheep and lambs are poor risks in feed lots. But Nation-wide campaigns are not well adapted for control purposes, since worm parasites and related infestations occur at different seasons in different parts of the country. Hence the control problem is largely an individual one. Federal and State research during 60 years has proved the effectiveness of several drugs and various management practices. Phenothiazine has been conspicuously successful against stomach worms and nodular worms.

Why parasitism in livestock rises and falls from year to year is a difficult question. Some persons regard wet years as favorable and dry years as unfavorable to the spread of parasites in sheep and other animals, but evidence does not wholly support this view. Variations in the nutritive value of range and pasture grasses sometimes provides a better explanation. Scientific findings and experience indicate that well-nourished animals are less susceptible to injury by parasites than poorly fed animals.

Swine Parasites Are Costly

Internal parasites reduce the value of market hogs in the Southeast at least 50 cents a head, or by as much as $50 for a shipment of 100 animals. Mild winters contribute to the survival of parasite eggs and larvae in the Southeast, but substantial losses from parasites occur also in other parts of the country.

A survey, by the Bureau of Animal Industry, of damage caused by internal parasites utilized figures on condemnations of parasitized livers, kidneys, casings, and affected loin and other cuts in establishments under Federal meat inspection. Kidneys and livers were the organs most seriously parasitized. On the average, about 94 percent of kidneys and 70 percent of livers failed to pass Federal inspection. The condemnation figures for most other organs and parts, ranged between 30 and 10 percent. The loss of valuable loin meat was about 2 percent, occasioned by trimming to remove affected portions.

Additional farm losses from swine parasites occur in the form of deaths, retarded growth, and increased feed costs. Cooperative experiments conducted by Federal and State investigators in Georgia showed that pigs rather heavily infested with lungworms, ascarids, and threadworms required 5 weeks longer to reach a weight of 215 pounds than pigs free of parasites or only slightly affected. Moreover the seriously parasitized pigs required four-fifths of a pound more feed to make a pound of gain. Prevention consists mainly in raising pigs in pastures and other clean surroundings rather than in old hog lots, but medicinal treatment is sometimes necessary.

Infected Instruments Can Spread Swamp Fever

Heavy losses of valuable horses in New England from infectious anemia, or swamp fever caused the Department to repeat previous warnings that the virus of this disease can be spread from infected to healthy animals by unsterilized hypodermic syringes, bleeding needles, or other contaminated instruments. Biting insects also may transmit the infection.

The outbreak was first discovered among horses at the Rockingham Park race track near Salem, N. H. The Department sent technicians to make examinations and render aid. They found that at least 47 of about 900 horses there had contracted the disease. Some of the sick horses had been shipped from Florida, and infected animals had probably gone to other points in New England. State authorities cooperated with the Bureau's technicians and imposed quarantines and other control measures.

Once affected with infectious anemia a horse retains the virus in its blood. One safeguard against the spread of the disease is the prompt destruction of affected animals, which are of little value for work or sport. Another safeguard is the use of only sterilized instruments in inoculations, blood sampling, tattooing, or related operations. Even a very small amount of blood can transmit the infection.

Newcastle Disease Research Progresses

Newcastle disease, a serious malady of chickens and turkeys, occurred during the year in 41 States and the District of Columbia. Characterized by a pneumonic condition and sometimes by nervous disorders and paralysis, the disease causes a sharp drop in egg production. Many birds in an affected flock may develop the disease, but the mortality among young birds is moderate and among old birds rather low. In an eastern broiler-producing area the disease was found on about 30 percent of the farms and broiler plants. Control with 2 commercial vaccines in broiler plant where 60,000 birds 3 to 4 weeks old were available for a test reduced the mortality in 2 vaccinated groups to a little less than 17 percent, as compared with a mortality of 35 percent among unvaccinated birds. Tests of disinfectants on the virus of Newcastle disease showed that a 2-percent solution of caustic soda, a cheap easily obtained chemical, was one of several effective chemicals.

More Rabies

Latest statistics on rabies in the United States based on reports from public-health and livestock sanitary authorities are for the calendar year 1946. The total number of cases reported by all States was 10,872, as compared with 9,963 for 1945. The figure for 1946 was larger than for any other recent year.

Human cases of rabies, 22 in all, were reported from 12 States—Alabama, Arkansas, Georgia, Illinois, Louisiana, Mississippi, New Jersey, Oklahoma, Pennsylvania, Tennessee, Texas, and Virginia. As in former years the great majority of rabid animals reported were dogs—18,384 in number—but there were also 962 cases of the disease

in cattle, 455 in cats, 44 in horses, 22 in swine, 15 in sheep, and nearly a thousand miscellaneous cases, mostly foxes. Reports of rabies in cattle are more numerous than in the past and in some areas such infection has caused heavy economic losses.

The Department has cooperated with medical, veterinary, and livestock authorities in developing prevention programs, adapted to both urban and rural areas. Most of them center about control of the disease in dogs. Rabies is a preventable disease. The chief problem is to obtain a wider adoption of recommended methods.

Penicillin Effective Against Erysipelas in Turkeys

Turkeys as well as swine are susceptible to the organism that causes swine erysipelas. It usually attacks flocks just before marketing time, when the birds are most valuable. Experiments by the Department indicate that the drug penicillin is effective in reducing the losses.

Use of penicillin in research work reduced the mortality of infected birds to 10 percent, when 100 percent of similarly infected untreated birds died. It appeared that the best method was to inject the penicillin into the wattles; this location is convenient and accommodates a large dose.

Feathers Graded by Air Buoyancy

Department research in the processing of chicken feathers has led to a method of grading them on the basis of their buoyancy in air. Feathers differ widely in their bulking quality and in the spinning quality of the fiber made from them. Grading for these qualities may be accomplished by air flotation, or blowing the feathers up a vertical tower and recovering them at different height openings on the basis of their air buoyancy. This procedure provides a measure of the weight of quill and the amount of fluff. By control of the relative humidity and velocity of the air, a mixed lot of feathers may be separated readily into six grades ranging from full fluff to no fluff. Feathers so graded may be blended as a filling material for pillows and upholstery and may also be converted into feather fiber and manufactured into fabric.

Purebred Livestock Importations Set Record

More purebred livestock entered the United States for breeding purposes during the year ended June 30, 1947, than in any previous year. The total number was 36,204, of which 28,915 were cattle, 4,210 sheep, 1,885 swine, and the remainder relatively small numbers of horses, goats, dogs, and cats. The importations exceeded those of the previous year by 10,232 animals, or 39 percent. Before World War II, total importations of purebred breeding animals into the United States were less than 14,000 annually.

The Tariff Act of 1930 provides that purebred animals for breeding purposes may enter the United States free of duty. Under that act the Department of Agriculture certifies animals whose papers give satisfactory evidence of their breeding. The result has been to en-

courage the introduction of high-quality foundation stock, leading sometimes to new breeds or types and the general improvement of domestic animals in the United States.

INDUSTRIAL UTILIZATION OF AGRICULTURAL COMMODITIES

Paint from peanuts, hard wax from sugarcane, and shotgun-shell casings made with soybean adhesives are a few of the industrial achievements resulting from research by Department chemists during the past year.

The Bureau of Agricultural and Industrial Chemistry, which operates the 4 Regional Research Laboratories that were authorized in 1938 to search for industrial outlets for farm products, is conducting investigations on more than 300 projects dealing with the utilization of agricultural commodities in industry and in the food and feed fields. This work has already resulted in the development of new and improved food and feed, and in the wider use of agricultural products in industry.

Paint From Peanuts

Chemists in the Southern Regional Research Laboratory in New Orleans appear to be on the verge of pushing the peanut into the middle of the industrial field. Scientists of that laboratory have produced a synthetic peanut-protein fiber called Sarelon. This new fiber has a light-cream color, and a soft, pleasant feel somewhat like silk and wool. It resembles wool in heat-insulating and moisture-absorbing qualities, shrinks very little in hot water, and takes dyes similar to those used on silk and wool. It can be used alone or mixed with other fibers. Interest is increasing in the production of this fiber for making fabrics. Three companies now have plans to engage in one or more of the operations required to make this new fiber from peanut protein.

The interesting thing about the research on peanuts is that it is pointing to the possibility of using peanut protein for making industrial products other than fiber. Chemists have developed a method for modifying peanut protein so that it can be used in paper-coating compositions. A special formula has been worked out which permits the modified protein to be incorporated with the paper-coating minerals, and favorable reports have been received from those who have tried the samples supplied them by the Southern Laboratory. Investigations thus far indicate that peanut protein has adhesive properties superior to some proteins now used in paper-coating mixtures.

The latest addition to the list of industrial items that can be made from peanuts is a cold-water paint. It utilizes the adhesive property found in peanut protein. Small experimental batches of this new-type paint have been made up and tried. The results in laboratory tests were satisfactory. The mixed paint had good flowing, brushing, and spreading qualities. It set up so that it could be touched without tacking, or sticking, in 2 hours, and was pronounced dry in 6 hours at a room temperature of 70° Fahrenheit. Contrary to expectations, it did not have a nutty or disagreeable odor.

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Hard Wax From Sugarcane

Hard wax is used extensively in this and other countries for polishing floors, furniture, shoes, and many other things. Carnauba is the name of the wax used primarily for this purpose. It is obtained by drying the leaves of a Brazilian palm and then beating the dried leaves together until the adhering wax falls off. The United States imports about 8 million pounds of this wax each year at a cost of approximately 18 million dollars.

For some reason nature coats the stalks of sugarcane with a wax similar to the imported carnauba. But the amount of wax on sugarcane stalks is so small, only 2 or 3 pounds per ton of cane, that recovery was considered too expensive until scientists at the Bureau of Agricultural and Industrial Chemistry's Sugar Station at Houma, La., worked out an economical way to collect the wax that settles in the "mud" or press cake that remains after the juice has been clarified. Under present methods of grinding cane the wax is discarded with the press cake which has a little value as a fertilizer but is largely a waste product often troublesome to dispose of.

As a result of this accomplishment it is now feasible to recover the crude wax from sugarcane and to purify it when necessary for industrial use. Small-scale commercial recovery of this wax will be undertaken by at least one large mill in Louisiana during the 1947–48 grinding season. If all the waste press cake produced in the United States, Hawaii, Cuba, and Puerto Rico were processed for wax the amount recovered would be more than the total amount of wax consumed in this country each year.

Processes for the recovery of salts of aconitic acid from the second, or "B," molasses during the manufacture of cane sugar and the conversion of aconitic to itaconic acid have also been worked out by the sugar chemists. Compounds of itaconic acid are valuable for making the strong transparent plastics used for the noses and windows of airplanes. Three carloads of high-grade aconitate were produced and profitably marketed by one sugar mill in Louisiana during the past grinding season. This mill makes sufficient sugar to enable it to recover approximately 500,000 pounds of aconitate per year with an increase in the purity of the molasses treated.

New Method for Producing Turpentine and Rosin

A new, improved, and more economical method for the production of turpentine and rosin is now in the pilot-plant stage as a result of investigations in the Bureau's Naval Stores Research Division.

The method consists of diluting the "gum" from southern pine trees with a little turpentine, heating the mixture and running it into a flash chamber at the upper end of a new-type continuous, steam still comprising a vertical, steam-jacketed metal column. The turpentine vapors pass over into a condenser, and the stripped gum, or rosin, runs from the bottom of the column directly into barrels. The new method is both faster and cheaper than the "batch" method that is in general use today. It uses one-third less steam than the most efficient steam still, and begins to turn out turpentine and rosin in about 5

minutes after the preheated gum enters the still. It also produces a little better grade of rosin than can be produced on the best of the steam stills.

Work on this new-type still has been under way for several years in the Bureau's naval stores station at Olustee, Fla. The scientists first designed a still with an upright column 6 inches in diameter and tested this out. The results were satisfactory. They next designed a still with a column 8 inches in diameter with a capacity of about 1 ton of rosin per hour. This still was so satisfactory that it was demonstrated to the public in the latter part of 1946. As a result of successful pilot-plant tests a full-commercial-size still with a 12-inch column is now being designed and built and may be put in operation during the 1947–48 naval stores season. This large still will have a capacity of about 2 tons of rosin per hour.

Keeping Quality of Home-Made Lard Improved

A simple, inexpensive method for improving the keeping quality of home-rendered lard is now available to farmers as a result of research in the Eastern Regional Laboratory in Philadelphia. This accomplishment is the result of research by scientists to find new uses for lard and other animal fats.

The method consists of adding 3 pounds of a hydrogenated vegetable oil, such as hydrogenated cottonseed oil, peanut oil, or corn oil, to each 50 pounds of lard at the time of rendering. The preferred way is to add the vegetable shortening to the rendered lard in the kettle just before settling and separating the cracklings in the lard press. Any one of a number of shortenings made by hydrogenation of vegetable oil, may be used. The success of this method is due to the presence of natural antioxidants in vegetable oil, which are not destroyed by hydrogenation. This development is of considerable economic importance to farmers, since rancid lard is unfit for food and not easily renovated after it becomes rancid. Lard is a high-energy fatty food that is almost completely digestible and contains accessory substances necessary for good nutrition.

New Type of Cottonseed Meal

Cottonseed meal produced by an improved solvent-extraction method developed in the Southern Regional Laboratory at New Orleans makes a better feed for young chicks and other poultry than cottonseed meal obtained by the usual solvent or compression methods.

Chicks fed on a ration containing the new-type cottonseed meal made excellent growth and at the end of 6 weeks weighed more than chicks fed on a similar ration containing ordinary cottonseed meal. The hatchability of eggs laid by hens fed this new meal was superior to that of eggs from hens fed on regular meal. The whites of eggs from hens fed the new-type meal did not turn pink under storage conditions as did those from hens fed on regular cottonseed meal.

Cottonseed oil is normally secured by pressing the delintered and hulled seed in a hydraulic press. Because this leaves behind in the press cake a substantial portion of oil, which is more valuable as oil

than as feed or fertilizer, processors have been looking forward to the development of a solvent-extraction method that would remedy this situation. With the new method cottonseed is separated into 3 parts—oil, pigment glands, and practically gland-free meal—instead of just oil and meal, the products obtained by present commercial methods. The removal of the pigment glands is responsible for the better meal, apparently because the pigments have certain toxic characteristics that have made cottonseed meal undesirable as a feed for certain animals. This development, which is now in the pilot-plant stage, gives promise of being of considerable economic importance to the Cotton Belt.

Dehydrofreezing

Dehydrofreezing is the name of a new process of fruit and vegetable preservation that has been developed in the Western Regional Research Laboratory at Albany, Calif.

This new method combines the advantages of dehydration with those of quick freezing. It carries the product through the first cycle of dehydration, which removes a considerable amount of the weighty moisture, and then freezes it. Vitamins and flavor are virtually undamaged; so the treated product not only retains the fresh quality, but in some instances its original shape also.

This new method appears to be better than either dehydration or freezing, partly because there is less destruction of tissues by the larger ice crystals that tend to be formed when a greater amount of water is present. The chief advantage of this process is a considerable saving in weight and bulk, which in turn creates a saving all the way down the line, including packaging materials, storage space, and transportation facilities. The method also increases the number of frozen fruits and vegetables that a retailer can store in his limited freezing-cabinet space, as well as the amount of food material that a housewife can store in her refrigerator. The process has passed through the laboratory stage with successful application to peas and apples, and is now ready for pilot-plant tests.

FORESTRY

Forest industry in the United States grew up largely on the basis of utilizing what was found on the land. Up to the present, virgin timber and what natural second growth came along have provided almost the entire supply. Man has taken only a very minor hand in growing the trees. As the stands of virgin timber recede and the best second growth gives way more and more to inferior growth, it is becoming increasingly necessary that positive steps be taken to grow the timber we need—in other words to practice forestry.

There is need, therefore, for sound information on protection and management of forests so that they will grow better products faster. There is also need for reduction of waste and more efficient utilization of the forest crop.

Forest Service research is bringing to light much valuable information on forest protection and management.

First results of an experiment started by the Southern Forest Experiment Station in 1937 show that of several timber-cutting methods tried, the most efficient for obtaining reproduction of young pine trees after cutting is to leave 15 to 20 per acre of the choicest trees as seed producers. Nine years after cutting, this method resulted in 6,300 established seedlings per acre, while the next-best method produced only 3,600. The seed trees may be harvested after new growth is established. These results indicate that heavy cuttings with the reservation of a generous seed source are most effective in getting abundant reproduction in loblolly-shortleaf pine.

Some form of partial or selective cutting appears to be best for the spruce-fir type in the Rocky Mountains. However, tests by the Rocky Mountain Forest and Range Experiment Station have shown that this method results in excessive wind-throw of trees, amounting to a loss of from 100 to 150 board feet per acre per year in the partially cut stands. A group-selection system—that is, cutting heavily in small patches and leaving patches of untouched, reasonably wind-firm growing stock between—has reduced wind-throw losses to about 50 board feet per acre per year. Here, as in many other forest types where the selection system is applicable, lighter and more frequent cuts seem to be best. And with increasing demands for timber products this kind of cutting is becoming economically possible over wider areas.

Evidence continues to accumulate that attention to immature stands results in marked improvement in future growth and yield, and often provides immediate income. A 50-year-old stand of loblolly and shortleaf pine in Louisiana that has been thinned every 5 years for the past 30 years has produced 64.2 cords per acre during that time, while an unthinned check plot produced only 48.2 cords per acre. The southern station has found that highest growth rates in southern pines have generally been obtained where heavy thinning is done.

In the production of naval stores a new line of research has been opened up with the discovery that a fungus (*Fusarium lateritium*) very greatly prolongs the flow of oleroresin from pine trees without causing "dry face." Tests have only recently begun, but early results are promising; over a period of several weeks gum yields have been as high when trees have been chipped once and treated with the fungus as when chipped every week without the fungus treatment. Another finding may help in the development of high-producing strains of pine trees for planting. Trees selected for high yield of gum have to be reproduced from cuttings because high yield may not be inherited by seedlings. During the past year it was found that rooting and growth of slash pine cuttings, which is difficult and uncertain, is improved by the use of supplemental fluorescent light. At the end of a 20-week period, cuttings under the light had grown several inches, while untreated cuttings had not begun height growth.

In the field of wood utilization, the Forest Products Laboratory, maintained by the Forest Service at Madison, Wis., has demonstrated experimentally that sawdust can be used for making boards of both the insulating and hardwood types. Highly hydrated or gelatinized wood pulp is used as the binder. For example, boards have been made consisting of 85 percent sawdust and 15 percent hydrated pulp. By

adding rosin or asphalt size to increase water resistance, sample boards have been produced with excellent resistance to high humidity, steaming, or freezing. Although it has been shown that such products from sawdust are technically possible, the limits of their economic practicability have not been worked out, and much remains to be done on this phase of the problem.

Experiments were conducted in cooperation with an agricultural school for improving soil and aiding plant growth with lignin. It was found that lignin itself adds little to the fertility of the soil but that it does aid water-holding power. Various nutrients have been added with encouraging results.

The Problem of Wood Waste

The Forest Service in 1947 completed a study of wastage in the utilization of wood in the United States. It reported that of the 188,500,000 tons of wood cut in the forests of this country each year for lumber, pulp and paper, and other commercial products, 108,900,000 tons, or 57 percent, is wasted or burned for fuel. Logging waste—tops and limbs of trees, cull logs, and other material left in the woods after cutting—amounts to 49 million tons, or 45 percent of the total waste. Only 7 percent of it is used for fuel. In the primary manufacturing of logs into products such as lumber, wood pulp and paper, veneer, cross ties, etc., 52.9 million tons of wood is wasted, or 49 percent of the total. About 60 percent of the primary manufacturing waste is burned for fuel. Secondary manufacture wasted 7 million tons, practically all of which was burned for fuel. The figures include material lost in waste pulping liquors, but does not include unused bark, conservatively estimated at 1.8 billion cubic feet.

The Forest Service found little comfort in the fact that 40 percent of the logging and manufacturing waste is used for fuel. Much of it is used inefficiently—many plants which burn their waste as boiler fuel, for instance, use a great deal more of it than is needed. And much of the waste used for fuel could be put to better uses, such as pulpwood or small-dimension stock, if economical handling and processing techniques could be developed.

Unfortunately, much of the unused wood is so scattered that it cannot at present be economically salvaged. However, several lines of action hold promise of reducing waste or of utilizing more of it: More research to find ways of making old products with less waste or to devise new ways of using material now wasted; technical assistance to woodland owners and wood processors; public aid in pioneering operations to establish the practicability of new waste-reducing or waste-consuming processes; greater integration of wood-using industries so that a variety of logging and manufacturing operations in a given locality will effect a more complete and advantageous utilization of the timber that is cut or that ought to be cut. Extension of sustained-yield forest management will be an incentive to better wood utilization. Where operators can count upon a sustained yield of timber, they can develop operations looking to full and continuous use of the forest crop.

Waste utilization is only part of the answer to the problem of timber supply. Good quality lumber, veneer, poles or piling, and many other needed products cannot be made from low-grade or small-size waste. We shall have to grow the timber. But to the extent that we can find ways to utilize profitably wood now wasted, we can expand industry and employment and we can increase the supply of useful products without increasing the drain on the forests.

Protection Against Forest Insects and Diseases

Insects and diseases cause greater losses in standing timber in the United States than does fire, partly because far less effort has been made to control them. In the decade 1934–43, the average annual drain on the forests from insects and diseases was estimated at 622 million cubic feet, compared to an average annual drain of 460 million cubic feet from fire during the same period. A Forest Service report issued in 1947 listed 58 major epidemics of forest pests since 1890 with losses so great and ramified as to be incalculable.

In 1947, Congress passed the Forest Pest Control Act (Public Law 104), which paves the way for more prompt detection and suppression of incipient outbreaks of destructive forest insects and diseases than has hitherto been taken. This act declares the Federal concern and responsibility in the control of forest insects and diseases on a Nation-wide basis and on lands in all classes of ownership. It authorized cooperation with the States and with private forest land owners to combat outbreaks of destructive pests and parasites.

The National Forests

The Forest Service continues its efforts to develop the national-forest system for maximum and continuing service to the people of the United States. During the year, a new national forest, the Six Rivers, was established by combining parts of the Trinity, Klamath, and Siskiyou National Forests in California. Several shifts of lands between other national forests also were made in the interest of better on-the-ground service and economical management. For the first time since 1942, a substantial sum was appropriated by Congress for the purchase of land for national forest purposes, and acquisition of several thousand acres of land, mainly in national-forest purchase units east of the Great Plains, was approved by the National Forest Reservation Commission.

An $18,900,000 timber-access road construction program was undertaken in the national forests during fiscal year 1947, $12,900,000 of the funds being supplied by the Federal Housing Expediter. New access roads helped make possible a rapid increase in the rate of timber cuttings as a contribution from the national forests toward meeting the shortage of lumber for housing and other needs. Total cut under sales and exchanges during the year was 3.8 billion board feet, an increase of 1.1 billion feet over 1946.

An agreement between the Forest Service and a logging company for the integrated management of 270,000 acres of company and Federal forest land in the State of Washington established the first coop-

erative sustained yield unit under a congressional act of 1944 authorizing such agreements. It will make possible maintenance of essentially the present rate of timber cut in the area, and thus assure permanence of employment for workers in the local forest industries and continued support for the towns of Shelton and McCleary, which depend on these industries.

Cooperation with States and Private Owners

Under the Norris-Doxey Act of 1937, 154 cooperative farm woodland management projects are now operating in 39 States, with about 600 counties involved. Most of the projects are under State direction, the Federal Government sharing half the cost. In this program, foresters provide on-the-ground assistance and technical advice to individual farm woodland owners, many of whom do not realize the value of their woodlands or have never before handled them with any thought of producing continuous crops of trees and steady cash incomes. While this work is markedly successful in encouraging better woods management, it is only a small attack on the big problem of improving practice on the forest lands in millions of small holdings, which altogether represent 75 percent of the country's total commercial forest land in private ownership. Recent studies indicated that only 4 percent of all timber cutting in small woodlands now meets the demands of good silviculture, while 71 percent of the cutting is poor or destructive.

The Timber-Supply Situation

Timber consumption in the United States greatly exceeds the saw-timber growth. We are eating into our forest capital. The trend toward timber scarcity will continue unless we take positive steps to build up timber growth. The situation calls for a great increase in the Nation's efforts to build up saw-timber growing stock, and protect it from improper cutting and from loss due to fire, insects, and disease. Our forest lands have large potential productivity, the effective development of which would bring permanent timber abundance. But we are a long way from that.

This country has about 460 million acres capable of growing commercial timber and available for that purpose. The timber on this land amounts to an estimated 470 billion *cubic* feet, and includes possibly 1,600 billion *board* feet of saw timber. Annual drain of saw timber, as estimated in 1944, was about 54 billion board feet, as compared with an estimated annual saw-timber growth of 35.3 billion feet. The drain was thus more than one and a half times the growth. Moreover, the Forest Service reports a marked deterioration in the average size and quality of timber reaching the mills. Heavy cutting takes a big toll of high-grade trees.

About 50 percent of the timber currently removed from the forests is cut for lumber. Some 20 percent is cut for fuel and 15 percent for pulp and paper products. The rest furnishes plywood, veneer, ties, cooperage, mine timbers, poles, posts, shingles, and many other products. More than three-quarters of the total production comes from

trees of saw-timber size. The United States also imports a large quantity of pulpwood—about 10 percent of its consumption. Moreover, the United States imports substantial quantities of wood pulp and paper, particularly newsprint, more than 80 percent of which comes from other countries, primarily Canada.

The deterioration of our saw timber principally affects the production of lumber, since this is the biggest item and requires the larger trees. Pulp mills can use smaller trees and the same applies, of course, to fuel wood. But many other products require saw timber, particularly veneer, cooperage, shingles, and piling.

Looking ahead, the Forest Service expects further expansion in our needs for timber products. Indeed, the demand is increasingly world-wide, although the world-wide trend of forest resources is downward. Any substantial increase in exports from this country, however, would cut into the domestic consumption or further reduce timber growing stock, or both.

Good forest management could ultimately build up forest growth sufficiently to meet prospective domestic saw-timber requirements and provide a margin for export. Early and vigorous action would greatly improve the chance, since forest improvement and conservation have cumulative effects. Many forest-land operators, both individual and corporate, are increasingly awake to the critical nature of the forest situation, and in many cases well informed as to what should be done.

But the problem of getting useful concerted action is very difficult, since the forest owners number several millions, large and small, and they vary greatly not only in their grasp of the forest problem but in their willingness or ability to practice proper forestry. Management is generally good in the public forests, but this accounts for only one-quarter of the total commercial forest area. In large corporate holdings forest management has improved greatly in recent years, but such holdings represent only about 16 percent of the total commercial forest area.

BREEDING EXPERIMENTS WITH DAIRY CATTLE

High average milk and butterfat production per cow is an indication of efficiency in a dairy herd. The efficiency of a breeding program is indicated not only by the progress toward a high average production but also by the increasing percentage of uniformly high-producing females born in the herd each generation and the diminishing number of low producers each generation.

The proved-sire system of breeding, which the Bureau of Dairy Industry has been following at its various experimental stations for many years, has demonstrated its worth as a sound method of improving the efficiency of a dairy herd. For example, in the Jersey herd at Beltsville, the continuous use of proved sires through five generations has raised the average production of butterfat from 608 pounds per cow in the foundation herd to 789 pounds in the fifth generation. In the first generation 71.5 percent of the daughters produced less than 700 pounds and only 28.5 percent were above that level. In the fifth

generation only 26.3 percent were below 700 pounds, whereas 73.7 percent were above that level.

Progress toward increasing the average production of the Nation's cattle could be speeded up enormously if enough good proved sires were available to meet the needs of the artificial-breeding organizations. One way to produce a large number of bulls of the desired quality would be to set up breeding centers in various dairy regions. By following the proved-sire system of breeding that has been used by the Bureau of Dairy Industry so successfully for nearly 30 years, such centers could in time produce enough bulls of dependable quality to meet the needs of a large-scale Nation-wide breeding program.

The young bulls born in the Bureau's experimental herds, which have been loaned for service and to be proved in cooperating farmers' herds, have been good enough on the average to raise the butterfat production level in the farm herds by 30 pounds per cow per year. The Bureau of Dairy Industry is now exploring the possibilities of establishing such breeding centers, in cooperation with several State agricultural colleges.

To make better use of the bulls now being born, it would be desirable to find some means of proving them earlier in life. The Bureau has conducted considerable research on the mammary-gland development in young heifer calves, and as a result has devised a method of examining the udder which gives an indication of the calf's future producing ability. If the method proves reliable after it has been tested in a large number of farm herds, there may be a possibility of estimating a bull's breeding value by examining his first crop of heifer calves when they are about 4 months old.

Beltsville Records Since 1929

Experiments have been under way at Beltsville since 1929 to develop information to guide those dairymen who have been intrigued by the possibilities of improving the production of their herds through cross breeding. Commercial dairymen usually are more interested in building up the level of production in their herds than in developing their cattle along the lines of a particular breed. Many of them have been doing some cross breeding, but with no guidance based on adequate experimentation.

In the Bureau's cross-breeding experiments to date, all cows have been mated to good proved sires. Milk-production records are now available on 58 cross-bred heifers. The 42 two-breed heifers on the average produced 133 pounds more butterfat than their straight-bred dams, and the 16 three-breed heifers made a further increase of 40 pounds over their two-breed dams. These results indicate that good proved sires will transmit their good production inheritance regardless of the breed of the cows to which they are mated. Artificial-breeding organizations usually have sires of three or more breeds, and the commercial dairyman who is a member of such an organization may find it to his advantage to have his cows impregnated with semen from the best bull available at breeding time, whether the bull is of the same breed as the cow or of a different breed.

Dairy Cattle Nutrition and Feeding Studies

Since protein is one of the most expensive nutrients in the dairy ration and farmers spend large sums of money for high-protein feeds, dairymen need better methods of saving the protein they raise in hay and other roughage crops. Experiments at Beltsville indicate that more than one-third of the protein in an acre of alfalfa hay may be lost when the crop is made into field-cured hay under humid conditions. Making the crop into silage, by the wilting method developed by the Bureau of Dairy Industry, saved 137 pounds more protein per acre than making field-cured hay. In terms of purchased protein supplements this was a saving of $15.60 an acre.

Feeding tests in which cows were fed field-cured alfalfa hay, or barn-cured hay, or wilted-alfalfa silage, cut from the same field at the same time, showed that the alfalfa silage produced 12 percent more milk per acre than the field-cured hay; and the barn-cured hay produced 8 percent more milk than an acre of field-cured hay.

Other feeding experiments by the Bureau have shown that dairy farmers can get along very well without purchasing high-protein feeds if they have plenty of good-quality roughage and ordinary farm grains. Cows in this experiment that were fed a single grain, like corn, barley, or kafir, along with good alfalfa hay or silage, produced almost as much milk as cows that were fed a complex mixture of grains and high-protein feeds. And the single-grain ration was cheaper. The alfalfa hay and silage fed with the single-grain ration furnished more protein than was required or used by the cows for milk production.

The amount of protein actually needed by dairy cows has long been a subject of interest to dairy investigators. A certain amount is needed, but protein consumed beyond the amount actually needed for maintenance and for milk production can be replaced by cheaper nutrients, particularly carbohydrates. Experiments are under way in the Bureau of Dairy Industry, in which three groups of cows are being fed protein at high, medium, and low levels, respectively. All cows have been milked through one lactation period and some through the second lactation. The results so far, which must be considered preliminary, have shown no advantage in feeding the high- or medium-protein ration. The ordinary farm grains, such as corn, oats, and barley, mixed together, will give a higher protein concentrate than was fed to the cows on the low-protein ration in this experiment.

Other experiments designed to reduce grain feeding on the dairy farm show that heifers can be grown successfully on roughage alone after they are about 10 months old. The usual feeding schedule in the Bureau of Dairy Industry herds at Beltsville has required about 2,500 pounds of grain for Holsteins, and somewhat less for Jerseys, from calfhood to 2 years of age. Heifers are now being raised successfully, however, on less than half that amount of grain. Good-quality hay is fed in unlimited quantities at all times, beginning as soon as the young calf will eat it, and grain feeding is gradually reduced until no grain is fed after about 10 months of age. Thereafter, the heifers are on an all-roughage ration consisting of No. 1 alfalfa hay, No. 1 timothy hay, and corn silage.

Dairy Products Research

Further improvement in the keeping quality of whole-milk powder seems possible as a result of several studies now under way in the laboratories of the Bureau of Dairy Industry.

When milk is heated, certain substances (sulfur compounds) are formed which have a delaying effect on the oxidation of the fat. These antioxidants are destroyed, however, by the usual drying procedures. Some time ago the Bureau scientists discovered that, by modifying the usual methods of preheating and drying the milk, they could preserve the antioxidants formed and prolong their antioxygenic activity. To date 33 lots of whole-milk powder have been made by the newly devised processing methods and also by usual methods, and 70 percent of the experimental samples have shown better keeping quality than the control samples.

In another study, ascorbic acid (vitamin C) was tested as an antioxidant. Fresh milk normally contains some ascorbic acid, but it is largely destroyed by processing. Milk containing 20 milligrams of ascorbic acid per liter was used as the control in this experiment, and enough ascorbic acid was added to each of three different lots to increase the concentration by 25, 50, and 100 percent, respectively. The milk was dried and evaluated for keeping quality. In every case the control was the poorest, and the keeping quality of the experimental lots was improved proportionately to the amount of ascorbic acid added.

Methods have now been developed by the Bureau of Dairy Industry for testing almost any dairy product to determine whether the milk or cream from which it was made had been pasteurized adequately. The method in each case is a modification and adaptation of the phosphatase test commonly used to determine the adequacy of pasteurization of whole milk.

Procedures have been developed for applying the test successfully and easily to Cheddar cheese, Swiss cheese, and other hard cheeses; process cheese and cheese spreads; cottage cheese and other soft, unripened cheese; cheese whey; milk; chocolate milk; cream; buttermilk; ice cream and sherbet; butter; and goat's milk.

The need for such a test was brought forcibly to the Bureau's attention during the war, when several epidemics of typhoid fever and of other less serious diseases were traced to the consumption of "young" cheese or fresh curd that had not been cured long enough to kill pathogenic bacteria. The development of the test has made it possible for the cheese industry and public-health officials to cooperate with Federal enforcement agencies in drawing up uniform and enforceable standards of identity, involving generally the use of pasteurized milk or a definite curing period, as a public health safeguard. The test also provides a means for establishing standards for other dairy products that would assure consumers of their wholesomeness.

An efficient process for fermenting the lactose (milk sugar) in whey to ethyl alcohol has been developed by the Bureau of Dairy Industry. Enormous quantities of whey are produced as a byproduct in cheese factories and in casein-manufacturing plants. Disposal of

the whey has long been a serious problem. The manufacture of alcohol not only offers a means of converting the whey into a marketable product of considerable value but also a means of avoiding difficult sewage-disposal problems and stream pollution.

Previous to the war the Bureau scientists had shown that alcohol could be produced from whey, and subsequently a search was made for yeast strains which would perform the fermentation process more efficiently. One of the many lactose-fermenting yeasts tested, *Torula cremoris*, proved exceptional in that it completed the fermentation in 55 hours. By using this yeast and regulating the temperature and acidity of the fermenting whey, yields of alcohol between 84 and 90 percent of those theoretically possible were obtained. About 3 gallons of 95-percent alcohol can be expected from 100 gallons of whey.

The equipment required is relatively inexpensive. The alcohol can be made as a byproduct of cheese or casein manufacture, using waste steam to concentrate the alcohol. The slops remaining are very nutritious, since they contain the protein and vitamins of the whey and the nutritious elements of the yeast, and make an excellent byproduct feed for cattle. Thus a former waste product which was hard to dispose of may become an asset and a valuable source of useful products.

Since age thickening of sweetened condensed milk limits the time it may be held in storage, studies were conducted in the laboratories of the Bureau of Dairy Industry to determine the effect of storage temperatures on the viscosity of the milk. Commercial samples of sweetened condensed milk were stored at seven different temperatures (from 50° to 131° F.) and examined periodically over a 2-year period. The milk became as thick in 4 days of storage at 131° as it did in 643 days at 60°. In other words, thickening increased in proportion to increases in storage temperature, the relationship being logarithmic with respect to time.

On the basis of the time and temperature relationships that were established, the investigators concluded that the milk could have been held 4,950 days at 30° without becoming too thick for satisfactory use. These results indicate clearly the importance of low temperatures for satisfactory storage over long periods.

It was also determined that sweetened condensed milk packed in barrels thickens more slowly than milk packed in small cans.

Some results of research with lactic acid in making protective coatings for metals, as replacement material for tin, were announced by the Bureau of Dairy Industry during the early part of the war. The research has now been completed, and the final results are of twofold interest to the dairy industry. Lactic acid, which is the principal ingredient in the coating materials that have been developed, can be made from milk; and the coatings can be used in place of tin on milk cans, cottage cheese pails, and cans for evaporated and condensed milk.

Four public-service patents have been issued covering the Bureau's work on the lactic acid resins and protective coatings, and four more patent applications are pending.

Lactic acid can be converted into a viscous, rather inert, resinous material by removing the water. This resinous lactic acid, combined

with oils, metals, or various substances, gives products that, when coated on metal and baked, are highly resistant to water, steam, and acids, and they are sufficiently resistant to alkalies so that the coated surfaces may be washed with hot solutions of soap or other common detergents.

THE WAR ON HARMFUL INSECTS

The spraying of cattle with DDT insecticides for hornfly control has materially altered range-management and feeder-stock practices within just two seasons. Some livestock owners say it is profitable to feed out stock for market during the hornfly season because range stock can now put on weight without losses due to these flies. Experiments during 1945 by the Bureau of Entomology and Plant Quarantine, in cooperation with State and local agencies, showed the possibility of controlling hornflies by use of DDT insecticides. It is estimated that during the 1947 season one-fifth of all cattle in the United States were treated once or more with DDT for the control of these flies.

Increased yields of potatoes, in some tests as much as 70 percent over the production on untreated areas, have followed the use of DDT insecticides. It was shown in 1944, through small experiments, that the common potato insects could be controlled with certain DDT preparations. More extensive testing in 1945 showed that this material is suitable for large-scale field use. In 1946, out of some 219,000 acres planted to potatoes in Maine, at least 85 percent (186,000 acres) was treated with DDT.

DDT is effective against some cotton insects. Entomologists discovered in 1944 that it is useful in the control of the cotton fleahopper and other sucking insects and also against the boolworn. It has been found ineffective, however, for practical use against the boll weevil, the most important pest of cotton in the Cotton Belt. On the other hand, in preliminary tests conducted during 1945, benzene hexachloride was found to be effective against the boll weevil, the cotton aphid, and most other insect pests of cotton though not against the bollworm. Experiments in 1946 indicated that combinations of DDT, benzene hexachloride, and sulfur applied in dust form were more effective against all insect pests of cotton than each material used separately. Tests with the mixture increased the yield more than 100 percent over that in plots treated with the older insecticides.

Use of DDT insecticides aids in Japanese beetle control. DDT kills the Japanese beetle in all its active stages and is the most potent weapon yet discovered against this insect. The home owner can protect ornamental trees and shrubs, the foliage of flowering plants, some fruits, and some vegetables, by means of DDT preparations. Such materials are being utilized in the cooperative Federal and State control activities. DDT is about 20 times more effective than lead arsenate for killing Japanese beetle grubs in the soil. Its use for that purpose at the rate of 25 pounds per acre has now been approved in cooperative Federal-State programs as equivalent to the larger dosage of lead arsenate.

Applied to growing corn, DDT controls the European corn borer. Greater benefits result from the use of this material on high value

crops, such as market sweet corn or corn grown for seed, than on field corn. Yet it is economically profitable to treat severely infested field corn, provided the crop remnants need not be fed to livestock.

Control of the European corn borer by means of insecticides was first attempted about 30 years ago. Materials then used were not effective under field conditions. Other insecticides such as rotenone and ryania were subsequently recommended, but the cost restricts their use to the high-value sweet corn. First discovered in the United States in 1917, the European corn borer has now spread over the entire Corn Belt. In North and South Dakota it was found for the first time in 1946. This insect caused farmers an estimated loss of 37 million dollars during 1946.

Tests and Results with Various Insecticides

A newly discovered insecticide, a chlorinated camphene, became available for experimental use in 1946. This is a synthetic chemical produced from wood turpentine obtained from pine stumps. Preliminary tests showed it to be more effective than any other single insecticide against the entire range of insect pests affecting cotton. However, the Bureau has made no recommendation as yet for the use of new insecticidal materials other than DDT for the control of insects on cotton. Much still remains to be learned about them before they can be recommended safely.

The sweetpotato weevil is an important and destructive insect. In 1946 it ruined nearly 12 percent of the sweetpotato crop in Louisiana, and caused a loss of about $3,000,000 to the farmers of that State. Control of the sweetpotato weevil has long depended upon the eradication of an alternate host plant, the wild morning-glory, whose vines together with voluntary sweetpotato plants and crop remnants provide food and shelter for the beetles over the winter. Without these plants, the beetles die by starvation. It appears now that herbicides may be of considerable value. Certain recently-found chemicals will kill a high percentage of the sweetpotato plants down to the crown, but have little or no effect on the potatoes. These chemicals might be used in the field. Other chemicals have been found which kill the vines to the crowns and the roots as well; they might be used to kill the alternate host plants of the weevil.

Scientists in the Department have found that bacteria which cause a disease of bees known as American foulbrood produce a substance which kills or checks the growth of many other bacteria which come in contact with it. Testing in cultures has indicated that this substance works against the bacteria which cause a number of serious human illnesses.

While working on the bee disease, a serious problem to beekeepers, entomologists discovered that a bee larva, dead from the disease, caused milk to become clear when dropped into it. Laboratory tests indicated that some substance produced by the bacteria inhibits the growth of other bacteria. The investigators extracted and tested this substance against bacteria that cause human and animal diseases, and developed a method of eliminating an undesirable toxic material. They are trying now to develop quicker and easier ways of producing the anti-

biotics. The National Institute of Health is cooperating in studies regarding the effect of this substance on bacteria of importance to human health.

Gas-propelled aerosol insecticides are changing insect control practices in greenhouses. Practices involving the use of Aerosols developed by the Bureau have given an efficacy previously unequaled. Even hydrocyanic acid gas, highly effective but dangerous in greenhouses, is not superior. DDT aerosols have been found effective against a number of insect pests in greenhouses. As little as 100 grams of DDT aerosol solution have proved sufficient for 1,000 cubic feet of greenhouse space. Properly formulated DDT aerosol insecticides have not injured plants. Some insects in greenhouses are not affected by DDT aerosols, but hexaethyl tetraphosphate, in an aerosol preparation, has now been found effective against certain of these insects. Tried on more than 130 plant species, this material has affected adversely only tomatoes and chrysanthemums. Weekly applications in rose houses over a period of months resulted in vigorous growth free from spider mites.

Mango Fruitfly in Hawaii

The mango fruitfly was found in the Hawaiian Islands May 10, 1946, for the first time. Established previously in certain islands in the southwest Pacific and in India, this important insect has spread extensively in the Hawaiian Islands, and infested more than 30 fruits there, including mature green bananas. Its presence in the Hawaiian chain implies that it might be accidentally introduced into the mainland of the United States. In fact quarantine inspectors have intercepted it in bananas on the west coast.

Losses From Forest Insects

Insects in the Nation's forests cause tremendous losses. An outbreak of Sitka spruce beetle has killed about 35½ million board feet of high-quality spruce on Kosciusko Island, Alaska. Sitka spruce, the finest stands of which occur on this island, is one of this country's most valuable specialty woods, and is used extensively in airplane construction. A survey in 1946 showed the outbreak to be advancing.

In western Colorado over 3 billion board feet of Engelmann spruce has been lost since 1940 from an outbreak of Engelmann spruce beetle. This insect has killed all but about 2 percent of the Engelmann spruce on most of the White River National Forest. The mountain pine beetle infests over 200,000 trees in the Caribou, Targhee, and Teton National Forests of Idaho and Montana. An outbreak began 3 or 4 years ago in the Caribou, spread northward into the Targhee and Teton National Forests, and now seriously threatens adjacent forests and the Grand Teton and Yellowstone National Parks. Spruce budworms caused considerable defoliation in 1946 in 3,000 square miles in the Adirondack Mountains of New York State.

Efficient insecticides for the control of defoliating insects can be distributed over forested areas by means of airplanes. Small-scale aerial applications of DDT in 1945 to forest areas infested by the

gypsy moth led entomologists to conclude that this was better than methods formerly available for controlling such pests. They found that as little as 1 pound of DDT dispersed in 1 gallon of solvent per acre would effectively control the gypsy moth. The DDT insecticides have a peculiar residual action. They can be applied before some important forest insects hatch. Weeks later the larvae come in contact with the residual insecticide and are killed. By means of airplanes it is possible to apply such insecticides in forest areas not accessible with ground equipment. Full-scale field tests in 1946 over nearly 100 square miles of Pennsylvania territory infested by gypsy moth proved much more effective and much less expensive than methods previously used. Ten small airplanes spread nearly 64,000 gallons of DDT insecticide.

A destructive outbreak of the Douglas fir tussock moth was discovered in 1946 in the Douglas fir and white fir forest stands of northern Idaho. It threatened about 500,000 acres of Federal, State, and private timberland. Knowledge gained in gypsy moth control by means of aircraft inspired the largest aerial insect-control program ever conducted in North America. This program, completed on July 2, 1947, involved the application of 390,881 gallons of DDT insecticide over 413,469 acres of mountainous forest lands infested with the Douglas fir tussock moth. Each airplane carried from 80 to 1,000 gallons. Applying the material required 2,120 flights. For the first time, large cargo-carrying type airplanes were used for the control of defoliating insects.

Herbicides for White Pine Blister Rust

Herbicides show promise in white pine blister rust control. Herbicides such as 2, 4–D may materially change the procedure for controlling white pine blister rust, one of the worst threats to young white pine forest stands. Certain herbicidal chemicals have had a limited use for this purpose for nearly 20 years. The development of 2, 4–D within the past few years provides an effective, nonpoisonous treatment. It can be used at low cost on susceptible *Ribes* over extensive sugar pine areas. Some varieties of currant and gooseberry plants, the alternate host plants of white pine blister rust, are sensitive to applications of 2, 4–D in very low dosages. Tests with a small spraying device, light enough for a man to carry, suggest that the use of 2, 4–D on currant and gooseberry varieties might kill these plants in *Ribes*-infested areas at a cost much less than that of hand pulling.

RESEARCH RESULTS AT EXPERIMENT STATIONS

Scientific work at the State agricultural experiment stations continues to produce results of great value to agriculture and to the Nation. Conducted often in cooperation with Federal research, and always in accordance with Federal-State arrangements to prevent duplication or excessive overlapping, the research covers all aspects of plant and animal husbandry. It emphasizes practical farm technology and at the same time underlines the importance of combining agriculture's

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rising productivity with efforts to distribute increased production profitably. Many State investigations combine technical with economic applications, especially in the local or regional sense. Thus various investigations during the war years answered to specific military requirements; there is an evident shift now to the altered postwar needs. Following are some State findings reported during 1947.

Soil Management

Much valuable information on soils and on the benefits that might be gained by farmers through the use of different systems of soil management has developed through research at the State experiment stations. A recent publication by the Illinois station on Cass County soils represent an outstanding forward step in making this knowledge available in a form that farmers can appreciate and use. Besides describing the soils of the county, it presents information on yields which can be expected from the principal field crops on the different soils under such practices as fertilization, liming, erosion control, crop rotations, use of crop residues, and fulfillment of the possible needs of the soil for minor elements.

Discoveries in Insect Control

Azobenzene fumigation, properly done, was found by the Ohio station to be as safe on cucumbers and tomatoes as other common acaricides and far more effective. When the plants are large and foliage is abundant much less labor is required than for a spray. Hexaethyl tetraphosphate also appeared to be very effective against red spider and is safe on cucumber and most other greenhouse crops but cannot be used on tomatoes. A positive correlation was observed between red spider populations on hothouse tomatoes and the amount of soluble salts in the soil—the more salts the more mites. Furthermore, practically no red spiders were found on tomatoes following a crop of lettuce.

When not controlled, red spider may reduce the value of the hothouse tomato crop by $10,000 an acre per year. The cost of labor and materials for fumigating an acre with azobenzene approximates $17; the spraying on, $23.50. Since two sprays are needed to equal the efficiency of one fumigation and about four fumigations may be needed per year, spraying costs about $120 more per acre per year. Tomato russet mite was also apparently eliminated by fumigation with azobenzene.

Machinery in Beet Growing

One center for the study of problems connected with the development of machinery for saving labor in sugar-beet production is the Colorado station. Commercial groups had spent an estimated million dollars in attempts to mechanize sugar-beet growing. Work at the station, however, has led to the development of new types of beet harvesters, which are now being manufactured by the hundreds. Mechanical beet thinning has also been effectively improved. Cost studies have shown that the beet farmer can save more than $40 per

acre by the proper use of machinery and, in addition, can largely free himself from the problem of transient labor. The research has cost about $20,000 a year; application of the results on only half of Colorado's sugar beet acreage would save the farmers an estimated 4 million dollars a year.

Corn Investigations

Shelled corn with a moisture content as high as 25 percent can be satisfactorily dried by forcing air through depths of 7 feet of grain in storage bins. This was determined by the Indiana station. Mold damage in drying is much more likely when the moisture content of the grain is high. With air flows of 25 cubic feet per minute or greater, a wet-bulb temperature of less than 60° F., and a moisture content under 28 percent, no mold damage developed in drying depths up to 8 feet of corn. Drying installations based on these results have been built by farmers and industrial concerns.

Among the investigations on corn earworm control, the North Carolina station reports that addition of 2 percent DDT to the oil used to treat the silk on sweet-corn ears reduced the numbers of ears damaged by this pest to half that occurring when oil alone was used. Jet nozzles were more effective than disk nozzles for applying DDT sprays to silking sweet-corn ears. Both types of treatment—DDT in oil or applied as a jet spray—resulted in less than 6 percent wormy ears. When it is remembered that anything less than 90 percent infestation of untreated ears may be considered a fairly low infestation in North Carolina, the effectiveness of these treatments is realized.

Vitamin A in Plants

The principal source of vitamin A in the American diet is the carotene in plants. Cantaloupes are an excellent source, and at the same time an important crop in Arizona. Recent work by the Arizona station has shown, however, that the carotene content of plants is not necessarily a measure of vitamin A activity, since the physiological availability of carotene varies in different plants. Work done during the year shows that the carotene in cantaloupe is highly available; for example, it is approximately two times more available than in alfalfa and spinach, three times more so than in carrots, and five times more available than in apricots, sweetpotatoes, and turnip greens.

Progress of a New Breed of Hogs

The Minnesota station reports further progress in the development and farmer acceptance of its new breed of hogs, Minnesota No. 1. This breed is derived from the original crossbred foundation of Tamworth and Danish Landrace parent stock made in 1937. By 1946 a sufficient number of herds had been established among farmers to justify the organization of a breeders' association. Accordingly on August 24, 1946, the Inbred Livestock Registry Association was formed. By May 1947 there were 146 registered breeders of Minnesota No. 1 hogs. In addition, there were between 25 and 50 breeders who had not as yet affiliated with the association. Herds of this line

may be found in Minnesota, Iowa, Missouri, Nebraska, South Dakota, Wisconsin, Illinois, Indiana, Michigan, Ohio, North Carolina, and Maryland.

The association started registering animals on December 1, 1946. By the end of May 1947 the association had recorded some 1,206. Although no definite figure is available concerning the number of boars being used, it is assumed, on the basis of the number of animals registered, that at least 1,000 boars were used by farmers the past fall for cross-breeding purposes. Moreover, many of these boars were used on more than 1 farm. It is estimated that something like 200,000 pigs carrying Minnesota No. 1 breeding will reach the market in 1947. Cooperating packing companies say the carcasses of these hogs are very superior.

Research in Fruits and Vegetables

Butylene glycol yields of approximately 40 percent were consistently obtained by the Oregon station from apple and pear wastes, based on the original sugar contents. Available wastes and cull fruits are estimated at 100,000 tons annually. This represents a potential of 4,000,000 pounds of butylene glycol, which at 1946 prices would have a value of over $1,000,000. In addition, conversion into the valuable butylene glycol would reduce the problem of waste disposal.

The Mississippi station found that dehydrated sweetpotato vine and leaf meal compare favorably with dehydrated alfalfa meal in riboflavin and carotene content chemically and gave equally good results in the growth of chicks, without noticeable differences in mortality, growth rate, or condition. The indications are that dehydrated sweetpotato vine and leaf would find a ready market for use in poultry rations. A yield of 1 to 1.5 tons of dehydrated sweetpotato vine and leaf meal, it is estimated, would return to the farmer $60 to $120 per acre for a product otherwise wasted.

Gains by Livestock

In tests by the Mississippi station thrifty 10-month-old beef-type calves made gains on oats, oats and wild winter peas, and oats and crimson clover for a 4-month period comparable to gains by similar calves from birth to weaning. Over periods of 140 to 150 days the daily gains by steers and heifers per head were only 20 percent below the gains usually made by similar cattle on full grain feed. Maximum utilization of winter grazing crops on well-fertilized land by weaning beef-type calves may also tend to prolong the marketing period of calves, and thus to level out the peak period of late summer and fall, when most grass cattle are marketed. Calves so handled will be sold at heavier weights, when prices of grass cattle are usually highest. The net profits of $12 to $27 per acre from winter grazing so stimulated the interest of farmers that several hundred thousand acres of winter grazing crops were planted throughout Mississippi in 1946.

Improving the hill-land and rice-land pastures of Louisiana with lime and fertilizers has practically doubled the production of beef per acre. In one test by the Louisiana station 272 pounds of beef per

acre were produced as compare to 76 pounds on unfertilized land; in another test the production was respectively 427 and 282 pounds. If 100 pounds more beef per acre could be produced on 1,000,000 acres of cheap land now producing little or no return, the gross income from beef cattle in that State could be increased by 40 to 60 percent and there would be little or no need to import beef products into the area.

Weed Control, Plant Breeding, and Soils

Weed-control studies by the Louisiana station showed that 2, 4-D will eliminate the three major weeds of rice fields at a cost of $3.50 per acre, an average increase of 5 barrels per acre having been obtained. Treatment of infested fields in 1946 netted an average of $36.50 per acre. This method of weed control on the infested area—estimated at more than 50,000 acres—would thus mean a saving to the rice crop of around $2,000,000.

Over a 7-year period the Lemont oats variety, developed by the North Carolina station and the Department, has had an 8-bushel lead on the next highest variety and has stood second in winter hardiness. In the Piedmont area where most of North Carolina oats is grown and where Lemont is best adapted, its use promised to result in approximately 1 million bushels more of this grain per year.

Breeding for hardiness and disease resistance at the western Washington station has resulted in several new red raspberries. One variety, the Washington, obtained from a cross of Cuthbert by Lloyd George, proved outstanding. A measured acre yielded over 9 tons of fruit, as compared with 4 tons for Cuthbert, the leading older variety. Under 1946 conditions and with prices around $600 a ton, this meant an increase of about $3,000 in gross value per acre. Washington outyields Cuthbert because of greater inherent productivity and relative freedom from disease; as a result, it is rapidly replacing Cuthbert and the older varieties.

Research on the restoration of "alkali" soils is paying out well. Where adequate drainage facilities were provided by the Utah station, the leaching of excessively alkaline soils with 4 feet of water resulted in fine crops of wheat, as compared with no crop at all on comparable unleached areas. Utilization of this information could easily cause the restoration to productivity of thousands of acres of waterlogged soils in that State, which have been barren for many years on account of excess salts. In central Wyoming, irrigation has often raised the water table and brought enough alkali to the surface to ruin the soil for crops. In investigations covering several years the Wyoming station developed methods for restoring such land to successful alfalfa production in 2 years at the moderate cost of $35 per acre. This also was accomplished by drainage to lower the water table and leaching out the "alkali" by irrigation.

Semi-arid soils are naturally deficient in organic matter and therefore in nitrogen. Nitrogen is the most costly plant food element in commercial fertilizers. Supplying these soils with nitrogen for crop growth is an important economic problem for the farmer. Studies made by the Arizona station of methods of culture as a means of build-

ing up the supply of nitrogen in these soils by stimulating nitrogen fixation from the air by soil bacteria showed that raw desert soil properly aerated and cropped with a 6-year rotation increased in nitrogen to the extent of 1,000 pounds of nitrogen per acre-foot in 12 years. At a value of 12 cents per pound for nitrogen this is equivalent to $120 per acre. In other words, in terms of the value of the nitrogen built up in this soil the value of this land has increased $120 per acre. This would amount to $10 per acre annually over the 12-year period and would represent a great saving in the farmer's fertilizer bill.

Storage Life of Pears

The storage of Anjou pears in an ethylene gas-free atmosphere tended to greatly extend their storage life, according to Oregon station research. Fruits thus held for 8 months were free of rots, firm and juicy, and of desirable eating quality. The Anjou pear produces very little ethylene, suggesting that storage by itself would be highly desirable. Utilization of the new knowledge will aid the pear industry and could easily add a million dollars to the producers' incomes.

Virus Disease of Carrots

With the bulk of the carrot seed used in the Nation produced in Idaho, the aster yellows threat of destruction to the crop caused great consternation. The Idaho station found, however, that by isolating the carrot fields and treating the seed, the incidence of this dangerous virus disease as well as that of bacterial blight could be greatly reduced. As a result of applying these findings there was only a trace of aster yellows in 27 carrot-seed fields surveyed during 1946. This has meant the saving of the carrot-seed industry.

Investigations with Insecticides

The Colorado station at Fort Collins has been experimenting with a new insecticide named Colorado 9; it is a bromo analog of DDT having the formula 2,2–bis (p-bromophenyl)–1, 1, 1–trichloroethane. Like DDT, it is stable, lethal to many insects, and not unpleasant in odor. Among the pests controlled by it are flies, potato and tomato psyllids, tuber flea beetles, and leafhoppers. DDT, when used at high concentrations on plants of the bean and pea family, has a definite depressing effect on the bacterial nodules, so important in fixing nitrogen from the air. In agricultural crop rotations, where such legumes are grown to increase soil nitrogen, DDT is therefore at a serious disadvantage. It is most significant that Colorado 9 has no such depressing effect, permitting its use on legumes without disturbing the nitrogen-fixing mechanism.

In Colorado, a leading bean-growing State, cutworms are a very important cause of losses. Investigating methods for their control over a 4-year period at an annual cost of $800, the Colorado station found one application of 3 percent DDT to be exceedingly effective. In untreated plots, the beans injured by this pest equaled 338 pounds per

acre, whereas one dusting with DDT reduced the loss to less than 3 percent per acre.

State Findings in Vegetable Investigations

The Colorado station has developed a new hot-water treatment for potatoes used in the manufacture of potato chips, which prevents the chip from turning dark brown and tasting scorched. This process—consisting of the extraction of traces of amino acids and reducing sugars—makes the costly maintenance of "warm up" storage unnecessary for potato-chip manufacturers; it also permits the use of many potato varieties which previously were unsuitable. In 1945, Colorado potatoes were made into 150 million pounds of chips worth more than 100 million dollars at the current prices of 72 cents a pound. Furthermore, it is believed that the same principles will apply to dehydrated potatoes, in which losses are suffered because of browning and deterioration after drying.

Following the disastrous 1946 epidemic of late blight, which cost tomato growers over $40,000,000 in crop losses, interested groups pressed the Government to establish a center for a tomato and potato late blight warning service. All States east of the Mississippi, along with Minnesota, Iowa, Missouri, Arkansas, Louisiana, and Texas, cooperated with the Department during the spring of 1947 in setting up a reporting service, with the Plant Disease Survey acting as the clearing house to receive and compile reports on the occurrence and rate of spread of the disease in this entire region and to send to summarized information back to every State. There the keymen use the facts in a blight forecasting and warning service by which tomato and potato growers may be guided.

When conditions favor the blight, growers are advised in time to put on the right dusts or sprays for protection of the crop. When blight conditions do not prevail, the growers save much time and money by eliminating any useless blight protection. It is expected that this valuable State-Federal crop-disease information service will expand and increase in usefulness to agriculture as the Weather Bureau Services have done, and likewise to the great benefit of the country.

Outstanding for resistance to the highly infectious bacterial ring rot is the new Teton variety of potato developed in cooperation with the Department since 1939 and released by the Wyoming station in 1946. With good yielding ability, it is finding acceptance in areas of the country where this disease—a comparatively recent invader from Europe—is serious. Tests by this station also disclose its superiority to Triumph and Irish Cobbler in baking quality.

Though celery has been grown on the muck lands of Palm Beach County, Fla., since the late 1920's, the mosaic diseases affecting this crop did not assume critical importance until about 1938; between that time and 1943, however, their incidence and severity increased so greatly that very heavy losses were encountered and it appeared that celery could no longer be grown in this section unless some means of control were found. In these Everglades plantings, weeds—and particularly dayflower (*Commelina nudiflora*)—were incriminated as reservoirs of the viruses.

Following this lead, a program of weed control around the seed bed area and in the fields was instituted by the Florida station in 1944 and in each succeeding year has been extended and intensified, including particularly the use of 2,4–D sprays during the last 2 years. It has been a great satisfaction to find that during this period the losses on a 200-acre farm have been reduced by 2,4–D sprays to less than 1 percent. In contrast to this, nearly 100 percent infection occurred on nearby weedy farms, with losses from these diseases currently amounting to as much as 300 crates per acre on at least one of these plantings.

In a further report on the cherry leaf spot situation, a West Virginia station survey of about 225 acres of sour cherries in 18 orchards showed that where growers, in 1945, followed spray practices recommended on the basis of the station results, a good crop followed in 1946. Where for various reasons the spraying had been poor or abandoned in 1945 after frost injury to the crop, the yields were low the following year and 1,288 trees had died during the winter of 1945–46. The total estimated loss of trees and crop on the surveyed acreage in 1 year due to inadequate spraying was over $121,000.

COOPERATIVE EXTENSION WORK

Farm people in 1947 faced adjustment problems caused by the war and by mechanical and scientific progress, and called on the Extension Service for new types of help. Congress had provided in the Bankhead-Flannagan Act of June 1945 for the broadening of cooperative extension activities. Under this act, $8,500,000 of increased funds became available in 1947. This money was used largely to employ additional personnel—128 county agricultural agents, 198 home demonstration agents, 190 Negro agents, 178 4–H Club agents and 946 assistant agents. In some 850 counties, home demonstration agents were not employed under the act because qualified persons could not be obtained at the salaries available. On July 1, 1947, about $1,000,000 intended largely for that purpose was turned back into the Treasury.

Nearly 11,000 cooperative extension workers were engaged in cooperative extension activities during this year, about 8,500 of them in county offices, and the others in State offices or in supervisory work. In the Federal Extension Service the staff totalled 234. For the 1947–48 fiscal year the allocated extension funds totaled approximately $56,000,000, roughly divided by services as follows: Federal funds, 50 percent; State funds, 25 percent; and county funds, 25 percent.

With half the farmers of the country renting freezer-lockers, extension agents gave them more help on how to prepare food for freezing. Home agents gave housewives advice in buying and other matters and helped with family financial planning, with work simplification, and with home remodeling. The Extension services distributed more than a million farm-home plans. Work on rural health problems received greatly increased attention.

About 3 million farmers received extension help in obtaining and using electricity. Extension agents handled 600,000 requests for help with machinery problems. They answered calls from city people as well as farmers for increased help in victory gardens, in landscaping work, in the development and care of lawns, and in problems common

to urban and rural life. They devoted about 10 percent of their time to marketing and economic problems, notably in connection with the outlook for crops and livestock.

More than half the States conducted training programs for new extension workers and 28 of the land-grant colleges gave credit courses in extension organization and methods. About 400 extension workers attended summer schools or short courses and an additional 350 received training in special workshops. Because much new extension activity involved home problems, the Extension Service made special efforts to recruit and train home extension agents. Their average salary, in 1947, was $2,745, as compared with $2,150 in June 1944; it was low, however, in comparison with the salaries paid for work of similar importance in other agencies. As previously mentioned, the low salary level interfered with the recruitment of home demonstration agents. Membership in home demonstration clubs increased about 36,000 and reached a total of more than 1,162,000 in 50,000 clubs.

Extension agents, in 1947, influenced some 4½ million farm families and 2 million other families to improve their farming and homemaking practices. The agents visited 2 million farms, distributed 18 million bulletins, made 47,000 radio talks, and issued 725,000 educational news and advice stories. They answered 7 million telephone calls for help and received 9 million visitors in their offices. They conducted 800,000 method and result demonstrations on better farming and homemaking practices, and held meetings with an aggregate attendance of more than 52 million people. Organized in 85 percent of all communities in the country, the extension work benefited from the cooperation of more than 1 million voluntary local leaders, about equally divided between the sexes. Some 45,000 older 4–H boys and girls served as youth leaders.

4–H Clubs and Other Extension Activities

Membership in 74,500 4–H and older youth clubs exceeded 1,615,000 boys and girls. Three out of every four members who started a club project completed it. Club members raised livestock, canned food, made clothes, improved homes, handled club administration, tackled community problems, and discussed world problems with the general aim of learning to be good farmers, homemakers, leaders, and citizens. More than 12 million boys and girls have had 4–H Club training during the last 25 years.

Extension agents in many counties helped to set up complete "balanced farming" demonstrations. In Missouri, 108 of the State's 114 counties had such demonstrations, which covered all phases of farm organization, of soil and forest conservation, and of resource utilization. Similar demonstrations were conducted in Arkansas, North Carolina, and Texas, and other States.

Crop-improvement associations organized largely by the Extension Service certified nearly 70 million bushels of improved planting seed—corn, wheat, cotton, alfalfa, potatoes, and a dozen other crops. One-variety cotton communities under extension leadership reported progress. Such communities in Texas, for example, received 40 million dollars more for their cotton than they would have received had it not

been of the same improved variety. About 40 percent of the cotton growers in the South were in one-variety communities.

Recruitment of Farm Labor

With prisoners of war withdrawn from the farm labor force, and with the number of imported foreign workers reduced to 45,000, the smallest number in 5 years, the Extension Service aided farmers in getting seasonal and year-round workers. For this purpose it expanded its information services by developing a series of regional Guides and other materials designed to inform prospective farm workers about the availability of farm jobs, and to direct them to areas of need. Information stations set up along the routes of migratory and other travel gave additional help. These various facilities supplied current and reliable information with regard to the number and kind of workers needed, the starting time and probable duration of jobs, the housing available, and the prevailing rates of pay.

The flow of migratory and other types of farm labor was heavier throughout the country than during the emergency years. The information stations gathered important data on the number of job seekers, their origin, their travel, and the kind of work they wanted. This data will produce an authentic pattern of the migratory labor movement, believed to comprise annually at least 600,000 persons.

PROFESSIONAL DEVELOPMENT

Acquiring and diffusing useful information on subjects connected with agriculture was a duty laid upon this Department in the Organic Act which established the institution in 1862. It soon became evident that the quality of its service would depend greatly on the professional preparation of its employees. Consequently, after consulting other Government agencies and leading educational institutions, the Secretary of Agriculture in 1921 established the Department of Agriculture Graduate School, as one means of improving the Federal service and increasing the usefulness of Federal employees.

The Graduate School has become a unique agency, at once an educational and service institution. First, it serves to develop and coordinate resources of the Department for educational needs; and, secondly, it functions as a link between the Department and other educational institutions which can use the Department's facilities and resources to advantage in training young men and women.

Organized, formal educational programs in the Graduate School center in Washington, where opportunities are provided for graduate and undergraduate work. Expansion has taken place since 1921 from an original faculty of 10 and an annual enrollment of 300 to a faculty of more than 300 and an enrollment of more than 6,000. Almost from the beginning these courses, given after hours and at the students' own expense, have been open to employees of other Government agencies, and to non-Federal employees to the extent that the facilities permit.

The curriculum reflects the interests and needs of the Federal service, in various levels and types of work. Provisions for the higher sci-

entific and administrative officials usually take the form of seminars or lecture series with discussion facilities. Current topics include antibiotics, insecticides, fungicides, engineering, and agricultural policy. Authorities in industry, in education, and in research contribute to the seminars and lecture series. Graduate study opportunities enable many employees to continue their work. Other programs furnish practical education applicable to daily tasks and train students for advancement. Organized into eight departments, each under the direction of specialists in the Federal service or in leading universities, the program furnishes a broad higher education in agriculture and related subjects.

The educational needs of field employees usually are met by enlisting the cooperation of local institutions. In some cases, however, such needs are met through short courses or institutes for groups of employees. These last from one to several weeks. For example, one such course given this year dealt with Extension teaching. Correspondence study aids Agriculture employees in isolated areas or in subjects not otherwise covered.

The Graduate School helps to coordinate the educational interests of the Department's bureaus. It affords means whereby graduate students and faculty members from land-grant and other institutions may use the Department's research resources. It cooperates in the assistance given by the Department in the orientation and training of students from foreign countries, of agricultural attaches, and of university and Federal officials in special fields such as marketing, public administration, and other functions.

THE DEPARTMENT'S PERSONNEL SITUATION

The Department met one of its most critical situations during the past fiscal year in the field of personnel administration. In the early part of the fiscal year the turn-over of personnel was heavy and it was still difficult to recruit persons to fill positions. Total employment was less than it had been before the war yet the scope of the Department's activities had considerably increased. Although not overstaffed, the Department was affected in the Government-wide postwar retrenchment along with agencies born of war necessity.

During the 1947 fiscal year, 8,458 full-time employees were separated as a direct result of reduction in force; more than half of these actions took place in the last month of the fiscal year. So broad were the effects that some career-service employees who had been with the Department as many as 15 or 20 years received dismissal notices. Special attention, however, was given to retaining career-service employees with veteran's preference.

Within the civil-service regulations, the Department did its utmost to administer the reduction program equitably. The separation of employees was not the total problem nor the most important part of it, but was rather the end result. Any equitable program to reduce personnel must include an effective reassignment procedure, whereby permanent employees affected by a reduction in one bureau may have consideration for jobs held by war-service employees in any other bureau. To retain competent public servants within a framework

designed to protect each individual's right to retention was contingent upon a reassignment process. Consequently, the Department's administrative machinery for this purpose was faced with two issues, namely, effectiveness on the one hand and equity on the other. The test of effectiveness was to make certain that in the retrenchment process those reassigned possessed qualifications equal or superior to job requirements; the test of equity was to make certain that those finally reached in the reassignment and separation process were persons with the least retention credits in their respective job spheres.

While continuing its regular work, the Office of Personnel devoted a good portion of its resources to this special task. First, it helped set up and direct the necessary administrative machinery in the several bureaus. Second, it endeavored to guarantee that the machinery was operating with justice to public and individual. Third, it helped the agencies with interbureau transfers so that reassignments could be Department wide. Fourth, it tried to make certain that those who were finally displaced had received every assistance the Department could render in getting jobs elsewhere. This complex problem will continue to be with us well into fiscal year 1948.

CLINTON P. ANDERSON,
Secretary of Agriculture.

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